

IRREGULAR COMPETITION: THE IMPACTS OF WATER COMPETITION WITHIN
THE TIGRIS AND EUPHRATES RIVERS ON IRREGULAR CONFLICT

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General Studies

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ABSTRACT

IRREGULAR COMPETITION: THE IMPACTS OF WATER COMPETITION
WITHIN THE TIGRIS AND EUPHRATES RIVERS ON IRREGULAR CONFLICT, by
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Since World War II a preponderance of armed conflict has been less/other than declared war between nation states. Irregular Warfare encompasses a broad range of conflicts involving state and non-state entities, and according to Samuel Huntington, “is a form of warfare by which the strategically weaker side assumes the tactical offensive in selected forms, times, and places.” Irregular Warfare during the twentieth and twenty-first centuries has had significant influence on the form and function of multiple dynamics within the Middle East. The dynamics of water resources have equally effected the region during this period. Both of these dynamics have had and continue to have significant impacts to the geography, population, and political structures in the region encompassing the Tigris and Euphrates rivers. The utility of water spans the spectrum of human needs from the basic individual need of consumable drinking water to industrial society needs such as electricity generation.

Competition for available water within the Tigris and Euphrates watershed has had significant impacts on IW conflict. Multiple attributes describing the function, form, and practice of the participants within the current conflict in Syria and Iraq are a function of water resource competition and stress. The purpose of this study is to explore the interconnected dynamics of water resource competition and stress and Irregular Warfare.

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ACRONYMS

AQI	Al Qaida in Iraq
COIN	Counterinsurgency
CT	Counterterrorism
FID	Foreign Internal Defense
GAP	Southeastern Anatolia Project (Turkish: Guneydogu Anadolu Projesi)
IS	Islamic State
IW	Irregular Warfare
PKK	Kurdistan Workers' Party or (Kurdish: Partiya Karkerên Kurdistanê)
UW	Unconventional Warfare

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CHAPTER 1

INTRODUCTION

This is another type of war, new in its intensity, ancient in its origin-war by guerrillas, subversives, insurgents, assassins, war by ambush instead of by combat; by infiltration, instead of aggression, seeking victory by eroding and exhausting the enemy instead of engaging him. It is a form of warfare uniquely adapted to what has been strangely called ‘wars of liberation,’ to undermine the efforts of new and poor countries to maintain the freedom that they have finally achieved. It preys on economic unrest and ethnic conflicts. It requires in those situations where we must counter it, and these are the kinds of challenges that will be before us in the next decade if freedom is to be saved, a whole new kind of strategy, a wholly different kind of force, and therefore a new and wholly different kind of military training.

— President John F. Kennedy
Remarks at West Point Graduation, June 6, 1962

Purpose

The purpose of the study is to facilitate better understanding of Irregular Warfare (IW) within the Tigris and Euphrates watershed by analyzing factors associated with competition for available water within the watershed. The issue is the watershed traverses multiple nation-states, ethnic, social, and religious boundaries creating friction points with regards to equitable use and management of the watershed. IW, being “a violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s),” will have unique manifestations with regards to water resource competition.¹ Friction points relating to equitable use and management of the watershed

can be a driving force and effect the specific conduct of IW within the Tigris and Euphrates watershed.

Problem Statement

What is the role of water competition within the Tigris and Euphrates watershed as a driver of IW? There are numerous contributing factors to the ongoing conflicts within Iraq and Syria. The Syrian civil war, expansion of the Islamic State (IS) in eastern Syria and Iraq, unification of Kurdish groups that threaten Turkish and Iraq territorial integrity, and a transregional refugee crisis has killed thousands and negatively affected millions. The current body of research regarding conflicts in the Tigris and Euphrates watershed centers on societal measures such as religious affiliation, ethnicity, and governance. Study and analysis of the military aspects of hydrology is not a new discipline, however, these studies tend to focus on the physical impact the body of water has on military operations. By looking at this problem from the IW point of view, which is more population centric than conventional warfare, this study will examine water competition and IW through the linkage of population and politics. Competition between the governments, factions and religious sects within Turkey, Syria, and Iraq for utilization of the Tigris and Euphrates rivers has been a significant factor since the mid-twentieth century.

This is a relational research problem in which the qualities and characteristics of the impacts of water resource competition on IW will be investigated. Competition for available water within the watershed exists throughout each individual river until the confluence of the Tigris and Euphrates rivers form the Shat al Arab waterway in southeastern Iraq. This case study will utilize mixed methods to examine existing

quantitative spatial data describing the Tigris and Euphrates watershed and data to quantify the value of water in terms of municipal, agricultural, industrial, and hydroelectric uses. Qualitative metrics and frameworks include military doctrine, regional history, and publications by irregular warfare theorists. Conflict measures such as areas of control and numbers of attacks will have quantitative and qualitative characteristics. By equating available water within the watershed to quantifiable value to the population in terms of agriculture, economy, and energy, this research work will be able to analyze changes to available water within the watershed over time driven by competition.

These changes will impact value based outputs such as municipal use, agriculture, economy, and energy which will in turn have effects on the population and the population's actions in IW. By showing a connection between competition for available water and impacts to IW, the study will help to provide increased understanding of conflict dynamics within the Tigris and Euphrates watershed.

Research Questions

What is the role of water competition within the Tigris and Euphrates watershed as a driver of IW? Subsidiary questions include: what is the value of water to the human populace? What are the sources of competition for the available water within the Tigris

and Euphrates watershed? What are the implications for IW due to the effect of a water resource constrained/stressed populace in the Tigris and Euphrates watershed?

Defining the Tigris and Euphrates River Watershed

The Tigris and Euphrates rivers are iconic hydrologic features that have impacted the course of human history and continue to be influential in the twenty-first century. This research will study the Tigris and Euphrates watershed from the respective headwaters to the confluence of the Tigris and Euphrates rivers which forms the Shatt al Arab waterway. A watershed is defined as the area of land “where all of the water that falls in it and drains off of it goes to a common outlet.”² “Span” is an appropriate idea to frame the significance of these rivers. Originating in the Eastern Anatolia region of Turkey, the Euphrates River spans 1,731 miles as it flows through riparian states of Turkey, Syria, and Iraq.³ Flowing from the Taurus Mountains and Eastern Anatolia, the Tigris spans 1,118 miles flowing through Turkey, Syria, and Iraq while receiving contributing flows from multiple tributaries originating in the Zagros Mountains of Iran.⁴ The confluence of the Tigris and Euphrates Rivers near Basrah, Iraq forms the Shatt al Arab waterway which continues on to the Persian Gulf.

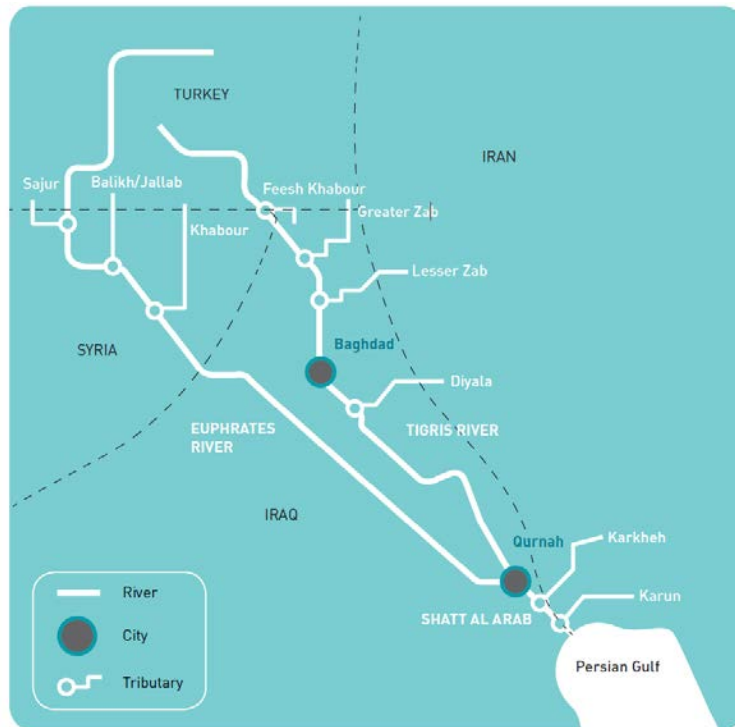


Figure 1. Tigris and Euphrates Watershed

Source: United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 106.

Human history within the Tigris and Euphrates River watershed is measured in millennia. With archeological and Biblical records dating back to 4,000 B.C., human settlement along these rivers span numerous empires and epochs and originate with early human civilization.⁵ Mesopotamia, taken from the Greek, means between the rivers. One of the original cradles of civilization, the people of Sumer benefited from the abundant food afforded by the fertile alluvial basins. The Abrahamic faiths have a critical connection to this era and the watershed. Abraham, the ancestral patriarch of the Semitic nations, and his father traversed the Tigris and Euphrates watershed journeying north to present day Turkey.⁶ Events and people associated with Mesopotamia will be a

significant theme throughout the scriptures that will come to make up the Torah, Bible, and Koran.

When Alexander the Great conquered the known world, the Tigris and Euphrates watershed is what united Alexander's empire and linked the east-west interaction that defined the Hellenistic era. Throughout late antiquity and the eras leading up to the 20th century, empires that controlled the Tigris and Euphrates Rivers generally controlled the Middle East and significantly influenced the greater trans Europe/Asia region. The Romans, Byzantines, Umayyad Caliphate, and Saljuq Turks controlled this region during the heights of their respective power.⁷ During the late Middle Ages, the region was often divided between multiple empires. The Ottoman Turk Empire reunited the Tigris and Euphrates watershed in 1566 with the conquest of Baghdad and lower Mesopotamia. For the next three and a half centuries the Tigris and Euphrates watershed was the eastern extent of the empire.⁸

Turkey, Syria, and Iraq are the modern era nation states that comprise the Tigris and Euphrates watersheds. The present day borders of these states are a function of the dissolution of the Ottoman Empire in 1918 following World War I. Of critical importance to this research is the distribution of different ethnic and religious groups across nation-state borders. From a macro regional perspective, the division of the Kurdish and Sunni Arabs populations between multiple nation states and the location of Shi'ite Arabs in the lower portions of the Tigris and Euphrates watershed are significant social factors that have affected and continue to affect government involvement and conflict associated with management of the Tigris and Euphrates watershed. In some regards, the distribution of various socio-ethnic groups throughout the individual riparian states has strengthened

national governments. The principle example is the Kurdish populations located in Turkey and Iraq. Though multiple examples of violent conflict have occurred between various Kurdish groups and the respective states, the geographic dynamics of further dissolution have enforced efforts to maintain national unity. Relations between the riparian states concerning water have been inherently national as opposed to socio-ethnic. The Alawite Syrian Government has expended great resources to develop its respective portion of the Euphrates River though the surrounding population is predominantly Sunni Arab and Kurdish. Friction associated with this development nearly lead to war between Syria and Iraq in 1975. Water management policy within the watershed has also been used to moderate internal socio-ethnic tensions. The Turkish Southeastern Anatolia Project (Kurdish: Guneydogu Anadolu Projesi, or GAP) and water management projects in northern and southern Iraq are each examples of national governments bringing increased development to regions with socio-ethnically contentious populations More specific analysis of these examples will be addressed later in this chapter and in chapter 4.

respectively, the riparian states of Turkey, Syria, and Iraq made significant alterations to the natural state of the rivers by the construction of dams, irrigation networks, and pump stations throughout the twentieth century by exercising their riparian rights.¹⁰ A riparian entity is one who owns the lands that “abuts” water and exercises the right to “reasonable” use of the water. Riparian rights are shared by the collective entities who own land abutting the water.¹¹ The proliferation of dams throughout the watershed is a function of Turkey, Syria, and Iraq exercising sovereign riparian rights to the water flowing through the respective countries. The undefined nature of “reasonable” use and collective sharing of a watershed will be a reoccurring point of friction throughout this research.



Figure 3. Tigris and Euphrates Watershed Dams

Source: Graphic built by author in Google Earth® based on data derived from: United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 63, 113, and 115.

The most significant water management project in the Tigris and Euphrates watershed is the GAP. The modern Turkish state built on Ottoman aspirations to harness the full potential of the Tigris and Euphrates watershed. With surveying and funding initiatives beginning in 1961, the GAP was a multiple decade project that, when completed, would construct 22 dams and 19 hydroelectric power plants along the Tigris and Euphrates rivers within Southeastern Anatolia.¹² To date, the GAP is 50 percent completed with construction continuing until 2047.¹³ The goal of the GAP was multifaceted in that it would bring economic and agriculture development to the poorest and most underdeveloped region in Turkey and aid in Turkish energy independence through increased hydroelectric output.¹⁴ The GAP has significant social and internal security aspects as well. By increasing development to the region, the GAP was a vehicle to bring economic and social inclusion to the Kurdish minority thereby moderating ethnic tensions.¹⁵

The GAP is a significant source of concern to Syria and Iraq in that it threatens the natural volume of water flowing through the watershed. Estimates from international organizations estimate that a fully completed GAP could decrease the volume of water exiting Turkey by 50 percent along the Euphrates and 14 percent along the Tigris.¹⁶ From the perspectives of Syria and Iraq, Turkish control of the watershed through the GAP places increased dependence on Turkish water management regardless of how equitable the distribution of flows. Observed decreases in water volume flowing through the Tigris

and Euphrates rivers in Syria and Iraq and the impacts of the decrease are specifically addressed in “The Value of Water” subsection of chapter 4.

The GAP had significant impacts on Turkey’s efforts to combat militant elements of the Kurdish Worker’s Party (PKK). The PKK is a militant separatist group located within the Kurdish population of southeastern Anatolia and represented a significant irregular military threat to the GAP and the Turkish government itself. Originally, the group had a Marxist/Leninist ideology with a Kurdish ethnic identity. Coinciding with major GAP construction efforts in the late 1980s, the Turkish military executed Counterterrorism (CT) and Counter-Insurgency (COIN) campaigns to destroy the group within Turkey which included frequent cross border operations into Iraq. By 1997, Turkish efforts had been successful in degrading the military effectiveness of the PKK.¹⁷ However, the increase in autonomy of the Iraqi Kurdish provinces following the 2003 invasion of the U.S. led coalition that deposed the Saddam government and Kurdish efforts to reclaim territory from the present day IS have renewed tensions between Turkey and the greater Kurdish nation. Since 2011, violent exchanges between the Turkish military and PKK have been a frequent occurrence in Turkey, Syria, and Iraq.¹⁸

Syrian damming along the Euphrates River began with the construction of the Tabqa Dam in 1975 followed by the Baath Dam in 1987 and the Tishreen Dam in 1999. The dams collectively provide flood control, hydroelectric power, and irrigation resources to eastern Syria.¹⁹ The filling of the Tabqa reservoir caused a significant dispute between Syria and Iraq in 1975. This coincided with the filling of the Keban reservoir in Turkey which greatly reduced the volume of water flowing through the Euphrates River. Fearing significant agricultural losses from decreased water, Iraq

demanded international intervention from Arab states in the region. The dispute resulted in multiple border incursions and an unattributed assassination of a Syria government official in Baghdad. Ultimately Saudi Arabian and Soviet mediation prevented military hostilities.²⁰ Though an equitable agreement was reached, the agreement did not produce a permanent or holistic agreement to collectively and reasonably utilize the water of the river.²¹

Throughout the 20th century, Iraq constructed four dams along the Euphrates River and three dams along the Tigris River. The dams collectively provide flood control, hydroelectric power, and irrigation resources.²² The distribution of Iraq's dams allowed the benefits of flood control and increased irrigation to be shared by multiple regions and social groups within the country. Flood control is a more significant function of dams in Iraq based on topography and location of major urban areas, especially Baghdad. During the 2003 invasion and subsequent years of Operations Iraqi Freedom and New Dawn, significant efforts were made to ensure insurgent activity did not threaten the dams or cause a catastrophic flooding event. During May and June 2014, significant U.S. coalition Special Operations (SO) were executed to secure the Mosul dam to prevent a catastrophic event from flooding the Tigris River Valley and ultimately Baghdad.²³

In total, the damming and water management projects executed by the riparian states within the watershed changed the fundamental nature of the Tigris and Euphrates watershed from a systematic perspective. The damming and water management projects

created manmade structures to control and influence the natural dynamics of the watershed and by extension the benefits of water to the surrounding human populations.

The Euphrates and Tigris River Basin Model (ETRBM) created by Mehmet Kucukmehmetoglu and Jean-Michel Guldmann in “Multiobjective Allocation of Transboundary Water Resources: Case of the Euphrates and Tigris” provides a holistic systems model to the watershed with mathematical conversions of water volume to economic based outputs. In Kucukmehmetoglu and Guldmann’s study, ETRBM is meant to replicate the physical form and structure of the watershed itself in a quantifiable model that shows a specific volume of water within a point(s) within the watershed that is available for demand. Discussing the ETRBM adds context and validity to the fundamental change represented by the dams and water management infrastructure created in the twentieth and twenty-first centuries.

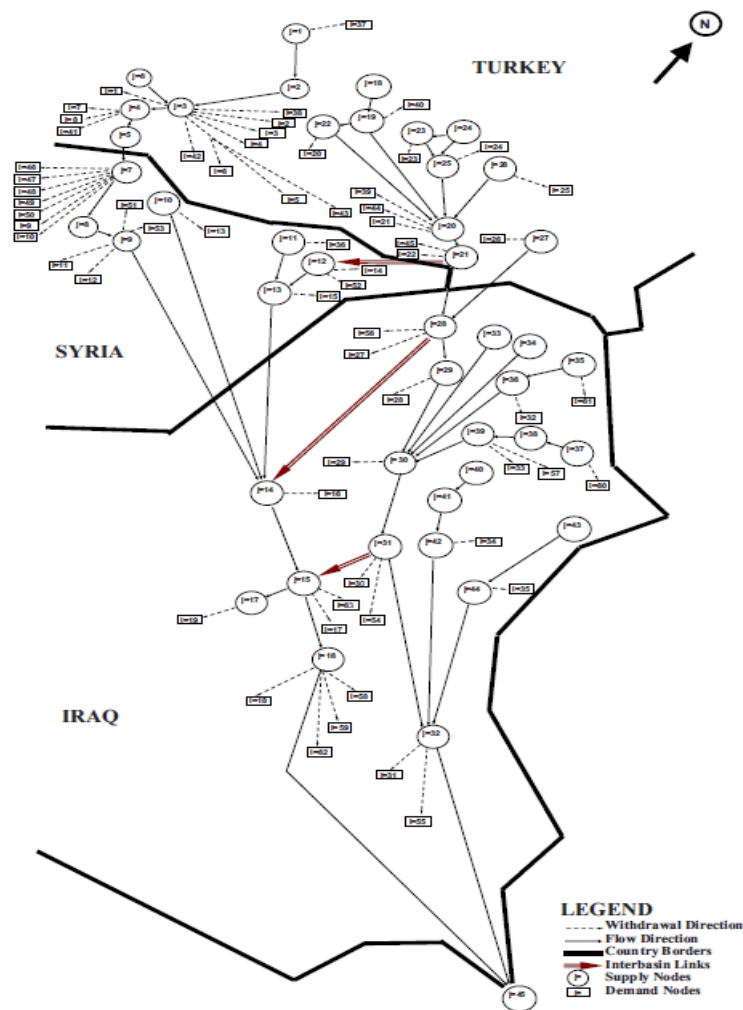


Figure 4. Kucukmehmetoglu and Guldmann's Euphrates Tigris River Basin Model (ETRBN)

Source: Mehmet Kucukmehmetoglu and Jean-Michel Guldmann, "Multiobjective Allocation of Transboundary Water Resources: Case of the Euphrates and Tigris," *Journal of Water Resources Planning and Management* 136, no. 1 (January 2010): 97.

Within the model, a "demand node" is a point at which water can be extracted or harnessed to produce a benefit for the user. The model groups water's benefits into "agricultural, urban, and energy" related activities.²⁴ Based at deprived values for

agriculture production, consumption of urban populations and energy production, the volume of water can be converted into a “Net Economic Benefit (NEB).” The study goes onto to model variations in water utilization within the watershed to show the corresponding changes to the specific NEB’s of Turkey, Syria and Iraq. This model is a pareto efficient equation with all available benefits of the watershed’s flows being utilized by the three riparian states.²⁵ This is a critical factor with respect to understanding the relationships of states and actors within the Tigris and Euphrates watershed in that increased use and derived benefit from the watershed will directly decrease the use and availability of another actor(s). The pareto efficient nature of the watershed is a significant factor when analyzing tensions and conflicts within the watershed and is referenced on multiple occasions in chapter 4.

Defining Warfare

Western definitions of warfare trace their modern roots to the Treaty of Westphalia in 1648 in which the modern era nation-state was formed. Conventional warfare is defined by military forces of nation-states exchanging military hostilities with one another. Current U.S. joint doctrine would define this type of warfare as a major operation or campaign.²⁶ Violent struggles outside of these narrow parameters have had multiple definitions in modern military history. Military thinkers such as T.E. Lawrence, Baron de Jomini, and Carl von Clausewitz address conflicts other than nation-state centric warfare with such terms as revolutionary warfare, nations in arms, tribal conflict, guerilla war, etc. Current U.S. joint doctrine classifies these types of conflicts as Irregular Warfare (IW). U.S. joint doctrine defines IW as “a violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s).”²⁷ IW is the “use

of organized violence for political purposes” and often manifests itself in attrition focused strategies against qualitatively superior adversaries. A key point regarding IW is that it occurs among the human populations living under “varying levels of effective governance and security.”²⁸ IW has dominated conflict in the 21st century as actors attempt to circumvent superior military capabilities held by a few nation states. Many security strategists believe that a preponderance of future military challenges will be population-centric IW conflicts.²⁹

Within to U.S. joint doctrine, IW is an umbrella term that comprises Counter-Insurgency Operations (COIN), Unconventional Warfare (UW), Foreign Internal Defense (FID), and Counterterrorism (CT) Operations.³⁰ Referencing figure 5, the critical aspect, with respect to the subtypes of IW, is the relationship of the U.S. to the nation-state(s) involved in the conflict. U.S. FID, COIN, and in most cases CT operations will be conducted in support of or in conjunction with a friendly government. There are select cases in which the U.S. has conducted CT operations in states in which the state refused to take direct action against the targeted organization. UW is the outlier within IW as it is U.S. support to insurgencies or resistance movements against a nation-state or occupying power.

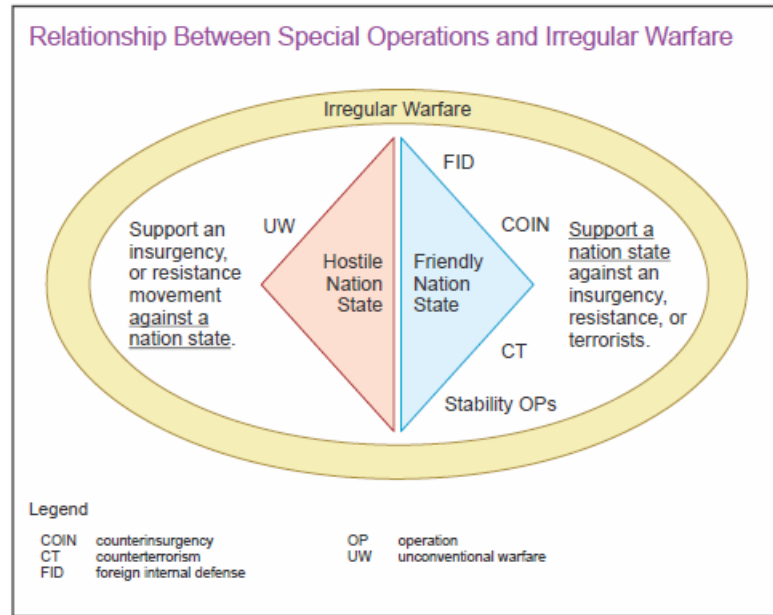


Figure 5. Irregular Warfare Framework

Source: Department of Defense, Joint Publication 3-05, *Special Operations* (Washington, DC: Government Printing Office, July 2014), II-2.

Counter Insurgency Operations (COIN) are defined as “comprehensive civilian and military efforts taken to defeat an insurgency and to address any core grievances.”³¹ Insurgency is a “struggle for some form of political power, whether that power is sought through reform, revolution, secession, nullification, or resistance.” Though political ends are the goal of an insurgency, an organized violent movement characterizes the methods of the insurgent.³² COIN operations are a whole of government approach in which the population must be influenced directly and indirectly to support the constituted government and deny support to adversary insurgency efforts. A vulnerable population, leadership, and lack of governmental control are the three prerequisites for an insurgency to be successful in a given environment. Figure 6 provides a broad architecture of insurgency causes. The figure is slightly skewed to a latent or incipient example. It is

important to note that acute rises in core grievances can initiate a mass base movement from which the insurgent leadership would grow.

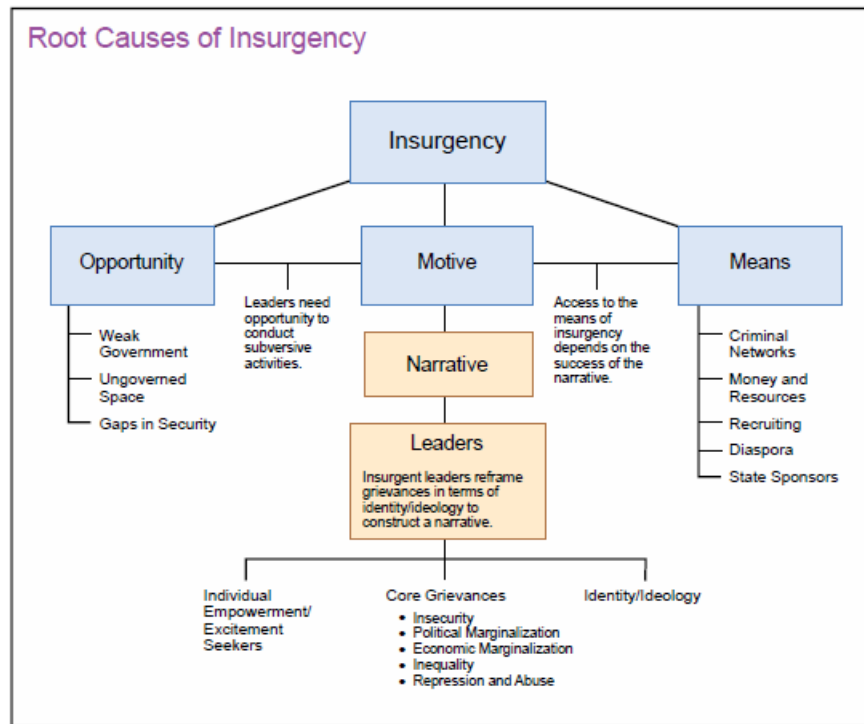


Figure 6. Root Causes of Insurgency

Source: Department of Defense, Joint Publication 3-24, *Counterinsurgency* (Washington, DC: Government Printing Office, November 2013), II-3.

U.S. COIN operations can be conducted utilizing three approaches: indirect, direct (not involving combat operations), and combat operations.³³ These approaches can be used in Ungoverned Areas, in conjunction with Major Combat Operations, and in support of FID operations.³⁴ The indirect approach seeks to augment the existing U.S. diplomatic presence in the country with additional economic and military capacity

through Security Assistance and Security Cooperation programs. Direct approaches remain focused on the self-sufficiency of the country. Operations such as Security Force Assistance provide increased latitude for U.S. entities to provide support beyond the capacity of a traditional country team. Specific operations might include Military Information Support Operations, Civil Affairs Operations, and various military training and support programs. Combat operations is the highest level of engagement that includes the above mentioned and ultimately U.S. forces conducting direct combat operations to defeat the insurgency.³⁵

Foreign Internal Defense (FID) “is participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization to free and protect its society from subversion, lawlessness, insurgency, terrorism, and other threats to its security.”³⁶ Though insurgency is listed in the definition of FID, it is important to note that FID operations are in support of the host nation’s Internal Defense and Development strategy and thus conducted in countries with a stronger, better functioning governmental and security apparatus when compared to COIN operations.³⁷ Because of the generally higher capacity of the host nation government, there are three types of FID approaches that include: indirect support, direct support, and combat operations. Examples of indirect approaches include multinational exercises, exchange programs, equipment.³⁸ Direct support approaches include civil military, information, and logistical support operations as well as direct training of host nation security forces and intelligence cooperation.³⁹ Combat operations include a wide array of military and whole of government support within the IDAD strategy of the host nation and are optimally conducted by the host nation’s security forces.⁴⁰ A signal

approach is not mutually exclusive to a particular operation. FID operations may utilize all three approaches at different locations and times and be executed across the Joint Phasing Model and Range of Military Operations. Regardless of approach, the purpose of FID is to strengthen an ally in order to combat internal threats.

Unconventional Warfare (UW) is defined “as activities conducted to enable a resistance movement or insurgency to coerce, disrupt, or overthrow a government or occupying power by operating through or with an underground, auxiliary, and guerrilla force in a denied area.”⁴¹ The purpose of UW is to enable a friendly insurgency against an adversary with the purpose of gaining a political advantage or gain political control. Referencing figure 5, the U.S. conducts UW when an existing resistance movement or insurgency’s goals are conducive to U.S. strategic interests. Much like FID operations, but in an inverse relationship to the state, the U.S. will conduct indirect and direct operations to enhance the legitimacy, popular support, logistical, and governance capacity of the resistance movement or insurgency. Use of “resistance” and “insurgency” within the definition connotes that the U.S. conducts UW to enable nonviolent or social movements to achieve coercive, disruptive, or governmental overthrow effects against the associated government or occupying power. In the case of violent or armed insurgency, U.S. support will include military support to the guerilla or armed wing of the insurgency against the associated government or occupying power.

Counterterrorism (CT) “is defined as actions taken directly against terrorist networks and indirectly to influence and render global and regional environments inhospitable to terrorist networks.”⁴² Though often defined by strikes and raids against high level leadership, CT can incorporate non-lethal effects such as information

operations directed at various aspects of the population. CT operations can be executed through U.S. Special Operations Command's Global SOF Network, through partner nation security forces, and through indigenous and surrogate entities.⁴³ Defining an act of terrorism, an individual terrorist, or a terrorist organization is complicated by varying legal frameworks and perspectives. Joint Publication 3-26 *Counterterrorism* defines terrorism as "the unlawful use of violence or threat of violence, often motivated by religious, political, or other ideological beliefs, to instill fear and coerce governments or societies in pursuit of goals that are usually political."⁴⁴ Referencing figure 5, there is commonality when comparing the motivations of terrorism, resistance movements, and insurgencies. However the goals of terrorism are broader and can manifest in three distinct types of structures. Independent groups are more similar to resistance movements in that the groups' goals are "narrow or regionally contained" and directed against a government whether local or foreign. Lone actors conduct terrorist acts that support a larger movement or ideology and rarely belong directly to a larger organization. The transnational network is a group of interconnected organizations and individuals operating in multiple countries and regions who commit acts of terrorism in support of a common ideology or goal.⁴⁵ CT differs from the other forms of U.S. IW in that it does not have a converse relationship to another form of U.S. IW like COIN and FID are the converse UW with respect to U.S. to the government or the resistance movement or insurgency. Thus, "terrorism is not in and of itself an ideology or a form of war. Terrorism is a tactic used by organizations trying to achieve specific goals."⁴⁶ Ultimately, terrorism is the use of extremely violent methods against primarily noncombatants that is so completely outside the bounds of lawful conflict that the methods place the

perpetrators in an illegitimate state that the associated movement or goal can never be viewed as legitimate.

Though often divergent in terminology and execution, the different types of IW have specific commonalities. These commonalities will highlight U.S. specific terminology to describe IW is a function of the U.S.'s role or strategic interests as it relates to the irregular group(s). IW is rooted in a societal grievance or differing ideology with a government or an occupying power. The grievance or differing ideology when shared by a common group within the populace takes the form of a movement with specific goals. The movement may be nonviolent and unarmed or violent and armed, however, this study will focused on violent armed activities. Irregular armed groups that actively take action to coercively, disruptively, or destructively affect a government or occupying are insurgent organizations. The specific methods of the insurgent organization will determine if the organization is a terrorist organization. An insurgency will always be a function of the population in which it operates because of the nature of its organization. Referencing the UW definition, the three parts of the insurgency consisting of the guerilla force, the underground, and the auxiliary are directly formed by the population. Individuals within the underground and auxiliary portions of the insurgency will remain in their normal daily life capacity while supporting the insurgent guerilla force. Because insurgencies inherently lack the resources and organizational structure of governments and governmental security forces, the insurgency is completely dependent on the population for logistical and resource support.

There are numerous methods and frameworks for evaluating IW. This study will utilize a time/phase approach that includes three distinct phases: pre-conflict, conflict,

and conflict resolution. During the pre-conflict stage of an IW conflict pre-existing conditions within a population(s), if any, will coalesce around current grievances against the government or occupying power forming a group identity, leadership, and goals. Bard E. O'Neill in *Insurgency and Terrorism* outlines specific categories of insurgency types based on the goals of the insurgency that provide more defined characterizations of insurgency(s) beyond the aforementioned U.S. joint doctrine. As the group operationalizes, recruitment, training, and logistical operations will occur in order to enable the group to oppose the government or occupying power. O'Neill's categories for insurgency(s) strategic approaches provides specific characterization of insurgent strategic approaches. The effectiveness of the government and security force response to the growth and development of the insurgency will determine the level of popular support of the insurgency and ultimately if the insurgency will expand to violent open conflict.

The open conflict stage of IW is often the easier stage to analyze because of the increase in observable activities. These activities include military, political, economic, and external assistance factors. In a broad sense military activity is divided into three categories: terrorism, guerrilla warfare, and conventional warfare.⁴⁷ Guerrilla warfare in the context of military tactics, as opposed to doctrinal definitions, is the use of military force to conduct generally small-scale, disruptive operations against an enemy for the purposes of exhausting the enemy as opposed to annihilation. Operations taking the form of raids and ambushes from dispersed locations/bases loosely define guerrilla warfare in doctrinal terms, though U.S. joint doctrine omits any specific definition. Conventional warfare, in the context of insurgency, is the use of larger formations to defeat adversary military formations and control territory in a traditional military sense. These definitions

of guerrilla and conventional warfare generally follow a Maoist framework but are applicable for broad study.

Political and economic activity will take the form and function of the insurgency type/goals and serve to enable the desired end-state of the insurgency as well as support military operations. Examples include insurgencies establishing state like functions such as taxation, running civil utilities, engaging in import/export activity, and performing judicial functions. External, third party actors can support insurgencies through a variety of political, economic, and military means. U.S. IW doctrine can be used to characterize types of external support. For U.S. entities, IW doctrine has doctrinal and statutory implications but generalized terms such as direct/indirect and political/economic/military support provide general definitions for third party support.

An IW conflict concludes with conflict resolution in which an action or series of actions bring the conflict to an end. Conflict resolution is much less discrete when compared to conventional warfare that often concludes with some sort of formal declaration signifying the cessation of hostilities. Appendix B Insurgency Evaluation Frameworks contains detailed charts of the frameworks referenced in this section.

Irregular Warfare in the Tigris and Euphrates Watershed

Since World War II, insurgency and terrorism has been the dominate form of conflict around the globe. Though the Arab-Israeli wars, the Iran-Iraq War, and the Gulf War were extremely significant conventional wars, insurgency and terrorism has had equal to or greater effect on the form and governmental function(s) of the Middle East. IW is an economically and resource efficient model that has afforded multiple groups within Turkey, Syria, and Iraq to have significant military and political effects in the

Tigris and Euphrates watershed.⁴⁸ Since 1950, Max Boot's *The Invisible Armies* Database found in his *Invisible Armies* and the Council on Foreign online publications identifies nine separate insurgencies in Turkey, Syria, and Iraq. Five of these are still ongoing.⁴⁹

Pre-dating the PKK insurgency, the Turkish government has been conducting CT and other political actions against the Revolutionary People's Liberation Party (DHKP/C) since 1978. The DHKP/C is the current manifestation of a Marxist/Leninist inspired ideology and rejects the Atatürk inspired vision of modern Turkey. Additionally, the group is opposed to Turkish North Atlantic Treaty Organization involvement and to Turkish support of United States foreign policy in the region.⁵⁰ Using O'Neill's frameworks, the DHKP/C is an egalitarian insurgency.⁵¹ Using an urban-warfare approach, the DHKP/C has conducted multiple terrorist attacks in the major urban centers of Ankara and Istanbul.⁵²

As discussed previously, the PKK has been an active insurgent force since 1983. Though the group has ideological roots in Marxist/Leninist ideology, the group's defining characteristic is its pro-Kurdish ethnic identity and desire for an autonomous Kurdish state.⁵³ This separatist movement utilizes a military-focused strategy that includes terrorist tactics to disrupt Turkish government control in southeastern Turkey.⁵⁴ PKK involvement and implications regarding the current conflict in Syria and Iraq will be further developed in chapters 4 and 5.

Iraq has combatted multiple ethnic centric separatist insurgencies involving the Kurds in northern Iraq and the Shi'ite Arabs in southeastern Iraq. Predating the Ba'ath government, the Iraqi Kurds conducted a military-focused strategy between 1961 and

1963 that Iraq ultimately defeated through brutal military action. Following the Gulf War, both the Shi'ite Arabs and Kurds attempted separatist, military focused insurgencies in their respective regions of Iraq that were swiftly defeated by the Iraqi military.⁵⁵

Predating 11 September 2001 and the subsequent U.S. led coalition invasion of Iraq, Ansar Al Islam is a Sunni Islamist terrorist organization that began an insurgency in Iraq in 2001 with the goal of establishing a state in Iraq governed by Islamic law and free of any western influence. Ansar Al Islam is a multi-ethnic group and was initially located in northeastern Iraq. Following the invasion and COIN operations conducted by the coalition, Ansar Al Islam was the second largest perpetrator of attacks on coalition forces in Iraq behind Al Qaida in Iraq (AQI).⁵⁶

Following the 2003 invasion of by coalition forces and removal of Saddam Hussein's Ba'athist government, multiple insurgent groups fought to expel coalition forces from Iraq. Led by Abu Musab al-Zarqawi, AQI became the dominant Sunni insurgent organization in the conflict. In addition to targeting coalition forces and the fledgling Iraq security forces, AQI conducted a devastating terrorist campaign against the Iraqi Shi'ite.⁵⁷ This traditionalist oriented affiliate of Al Qaida differed dramatically in approach. Though military-focused and connected to a large international network of support and foreign fighter sources, AQI sought an inside out approach by first gaining control of Iraq both from the coalition and from the Shi'ite dominated government. This approach contrasted with Al Qaida's leadership philosophy of degrading the western/non-Islamic powers to the point that they could no longer control or influence the Middle East. Multiple Shi'ite Arab insurgent organizations were active as well. The most notable was Moqtada al Sadr's Jaish al Mahdi. The Shi'ite groups had multiple ties to third party

support and pursued multiple goals that included disrupting coalition forces, influencing the Government of Iraq, and protecting the Shi'ite population.⁵⁸ Following the surge of additional U.S. troops to Iraq in 2007 and the uprising of Sunni Iraqis against AQI (known as the Sons of Iraq), the Iraqi government and security forces developed the capacity to assume control of governmental and security operations in Iraq.⁵⁹ U.S. COIN operations concluded in Iraq in 2011 with a full departure of coalition troops though remnants of numerous insurgent groups remained active in Iraq. The inside out geographic focus of AQI and AQI's connection to the predominantly Sunni Arab provinces of eastern Syria that served as a line of support for foreign fighter flow and safe haven is significant in connecting the organization's history during the Iraq insurgency to the current conflict.

Similar to Iraq and Turkey, Syria experienced a significant insurgency that predated the post 11 September 2001 era of conflict. The Syrian Muslim Brotherhood attempted to overthrow the government led by Hafez al Assad between 1976 and 1983. The Syrian branch, like other Muslim Brotherhood affiliates, was a traditionalist insurgency seeking to restore Islamic rule in the secular, Ba'ath controlled Syria. Urban-warfare is the best characterization of the strategic approach in that the group attempted to isolate specific cities from Syrian government control. The insurgency culminated with the destruction of Hama by the Syrian Army in 1982 and subsequent political actions that included banning the Muslim Brotherhood as a political party in Syria.⁶⁰

The current conflict in Syria and Iraq began on 15 March 2011 in Dar'a Syria. The movement initially began as civil protests against the Syria Government in response to multiple socio-economic grievances that will be further discussed in chapter 4. After

violent Syria government reactions to the protests, members of the Syrian military began to defect and ultimately formed the Free Syrian Army, the first militant component of the conflict. During the initial phases of the conflict, the Syrian National Council generally represented the political portions of the movement but was too diverse/divergent in goals to achieve effects or characterize under one insurgency type.⁶¹ By December 2011, AQI formed Jabhat al Nusra (the Nusra Front) which initiated terrorist attacks in Damascus with the goal of destroying the current Syrian government.⁶² The Nusra Front continued its Iraq approach through a military-focused strategy utilizing terrorist tactics.⁶³ Characterizing and categorizing the fractured and various opposition groups fighting to overthrow the Syrian Government is a complicated and biased task. Most open source reporting sources generally categorized the Free Syrian Army, Nusra Front, and other similar organizations as the rebel opposition. Current subdivisions of the rebel opposition generally correspond to third party characterizations of the group. This study will follow this approach for clarity of terms.

The next significant event in the Syrian conflict was the seizure of Raqqah in eastern Syria by rebel forces in March 2013.⁶⁴ The differences in approach between Al Qaida's international leadership and AQI manifested in the Syria conflict. Raqqah represented a secure geographic area versus the contested urban areas of Damascus and Aleppo in the east which are more religiously and ethnically diverse. This led to divide within the Al Qaida affiliated groups operating in Syria with the groups in eastern Syria beginning to identify as the Islamic State of Iraq and the Levant. Here after this group is referred to as the Islamic State (IS). The divide ultimately led to a formal split of IS and the Nusra Front and other Al Qaida affiliated organizations in February 2014. The Nusra

Front and other rebel groups forced IS out of western Syria allowing IS to consolidate territory in eastern Syria ultimately forming the self-described caliphate of Syria and Iraq. During the spring and early summer of 2014, a swell of foreign fighters and external support allowed IS to consolidate control of significant territorial gains and expand operations east across the Syria-Iraq border.⁶⁵

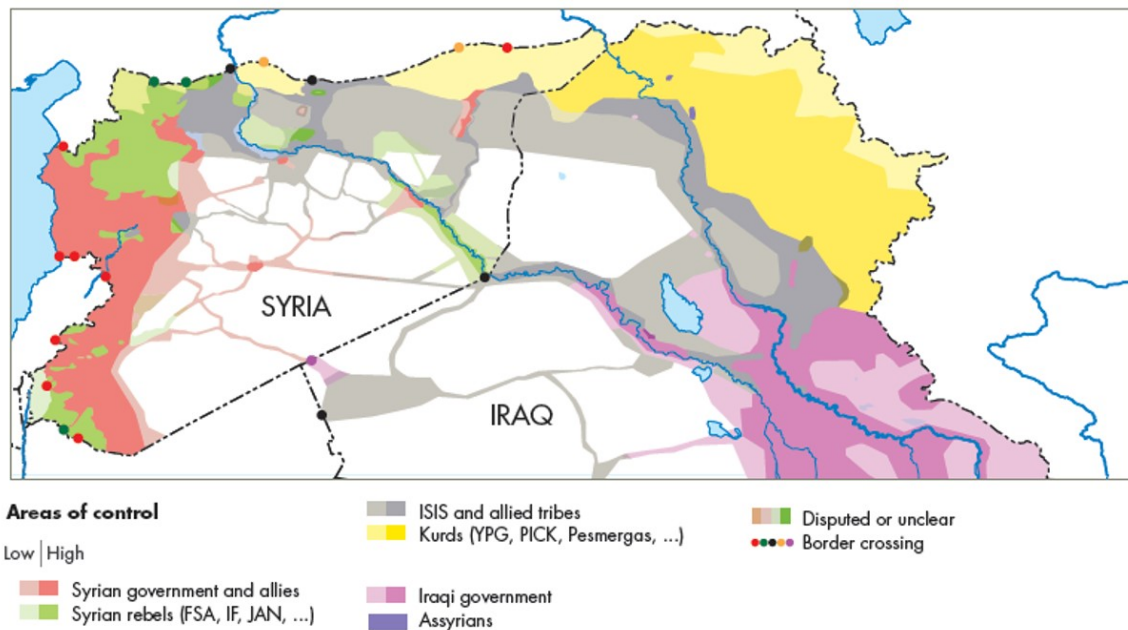


Figure 7. Areas of Control Iraq and Syria 24 June 2014

Source: Brian Michael Jenkins, “How the Current Conflicts Are Shaping the Future of Syria and Iraq” (RAND Perspectives, 2015), 5, accessed 30 April 2017, http://www.rand.org/content/dam/rand/pubs/perspectives/PE100/PE163/RAND_PE163.pdf.

A significant contributor to IS’s ability to gain control of and operate in Iraq was the capture of Fallujah in Iraq in January 2014. Between June and July 2014, IS operations transitioned to conventional type military operations in which IS elements defeated significant numbers of Iraqi security forces in western and northern Iraq. After

the fall of Mosul in northern Iraq and IS forces threatening to seize portions of Baghdad, U.S. led coalition forces intervened to prevent the collapse of Iraq.⁶⁶ This military operation and subsequent military operations to degrade and disrupt IS in Syria became Operation Inherent Resolve (OIR).

The establishment of and spread of IS had significant effects on multiple Kurdish groups in Turkey, Iraq, and Syria. Most of Iraq's Kurdish population is located in the three northernmost provinces in Iraq. The 2005 Iraqi constitution established this semiautonomous region governed by the Kurdistan Regional Government. The Peshmerga is the uniformed security force of Kurdistan Regional Government. The Peshmerga were instrumental in halting the IS's advance into Iraq in 2014. The relative success of the Peshmerga contrasted greatly with the operational collapse of Iraqi Army forces in northern and western Iraq. Increased Iraqi Kurdish nationalism continues to be a significant factor in regional dynamics effecting numerous national policy and counter-IS strategies. After the collapse of Syrian Government control in eastern Syria, the Kurdish Democratic Union Party (Kurdish: Partiya Yekîtiya Demokrat, PYD) assumed governmental control and function within Hasakah province. The People's Protection Unit (Kurdish: Yekîneyên Parastina Gel, YPG) is the militant arm of the PYD. The YPG has had numerous military successes against IS enabled by U.S. airstrikes and Special Operations support throughout the current conflict.⁶⁷ The PYD/YPG are affiliated with the Turkish PKK which has complicated relations between the U.S. and Turkey regarding counter-IS policy and operations. Throughout the current conflict in Syria and Iraq, Turkey has attempted through generally peaceful measures to negotiate with the PKK in the interest of further integrating the Kurdish population in southeastern Turkey into

greater Turkish society and government.⁶⁸ Numerous policy makers assert that questions of Kurdish independence/autonomy within Turkey, Syria, and Iraq is an essential function of conflict resolution in Syria and Iraq.

Irregular Warfare and Water Wars

Multiple sources have concluded that state-centric conventional conflict for access to water in the Tigris and Euphrates watershed is unlikely due to the high costs and impacts of war compared to negotiated settlements.⁶⁹ Since 2003, the ability of Iraq and Syria to govern and control territory has eroded and in some instances completely collapsed. As non-state actors such as IS exert state-like control over parts of the Tigris and Euphrates watershed, the question of water centric conflict must be revisited from the IW point of view to evaluate the threat of water conflict against new forms of control in the region. Turkey's willingness to equitably release water, a Kurdish controlled Syria-Turkey and Iraq-Turkey border, and a large Sunni population positioned in the middle of the watershed represented by fractured governments are the critical dynamics that will have significant impacts to all aspects of stability in the watershed to include water driven conflicts.

¹ Department of Defense, Joint Publication (JP) 3-05, *Special Operations* (Washington, DC: Government Printing Office, July 2014), II-2 and II-3.

² United States Geological Survey (USGS) Water School, "Water Science Glossary of Terms," October 2016, accessed 17 November 2016, <http://water.usgs.gov/edu/dictionary.html>.

³ United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 48.

⁴ *Ibid.*, 101.

⁵ Frederick M. Lorenz and Edward J. Erickson, *The Euphrates Triangle Security Implications of the Southeastern Anatolia Project* (Washington, DC: National Defense University Press, 1999), 3.

⁶ Robin Currie and Stephen G. Hyslop, *The Letter and the Scroll, What Archaeology Tells Us About the Bible* (Washington, DC: National Geographic, 2009), 26-27.

⁷ Ian Barnes and Malise Ruthven, *Crossroads of War: A Historical Atlas of the Middle East* (Cambridge, MA: The Belknap Press, 2014), 111, 114.

⁸ Ibid., 141.

⁹ UN-ESCWA and Federal Institute for Geosciences and Natural Resources (BGR), 63.

¹⁰ Lorenz and Erickson, 4.

¹¹ United States Geological Survey.

¹² Lorenz and Erickson, 1 and 6.

¹³ UN-ESCWA and Federal Institute for Geosciences and Natural Resources (BGR), 64.

¹⁴ Lorenz and Erickson, 2.

¹⁵ Ibid., 6 and 20.

¹⁶ UN-ESCWA and Federal Institute for Geosciences and Natural Resources (BGR), 64.

¹⁷ Lorenz and Erickson, 19-21.

¹⁸ National Counterterrorism Center, "Turkey Domestic Terrorism," Counterterrorism Guide, accessed 15 April 2017, https://www.nctc.gov/site/groups/turkey_domestic_terrorism.html.

¹⁹ UN-ESCWA and Federal Institute for Geosciences and Natural Resources (BGR), 63.

²⁰ Lorenz and Erickson, 22-23.

²¹ Ibid., 23.

²² UN-ESCWA and Federal Institute for Geosciences and Natural Resources (BGR), 63.

²³ Erin Cunningham, “Islamic State Jihadists Are Using Water as a Weapon in Iraq,” *Washington Post*, 7 October 2014, accessed 15 April 2017, https://www.washingtonpost.com/world/middle_east/islamic-state-jihadists-are-using-water-as-a-weapon-in-iraq/2014/10/06/aead6792-79ec-4c7c-8f2f-fd7b95765d09_story.html.

²⁴ Mehmet Kucukmehmetoglu and Jean-Michel Guldman, “Multiobjective Allocation of Transboundary Water Resources: Case of the Euphrates and Tigris,” *Journal of Water Resources Planning and Management* 136, no. 1 (January 2010): 97.

²⁵ *Ibid.*, 101

²⁶ Department of Defense, Joint Publication (JP) 3-0, *Operations* (Washington, DC: Government Printing Office, August 2011), V-1.

²⁷ Department of Defense, *Special Operations 2014*, II-2, 3.

²⁸ LTG(R) Charles T. Cleveland, LTC(R) Shaw S. Pick, and LTC Stuart L. Farris, “Shedding Light on the Gray Zone,” *Army Magazine*, 17 August 2015, accessed 5 November 2016, <http://www.armymagazine.org/2015/08/17/shedding-light-on-the-gray-zone/>.

²⁹ *Ibid.*

³⁰ Department of Defense, *Special Operations*, II-3.

³¹ *Ibid.*, xi.

³² Department of Defense, Joint Publication (JP) 3-24, *Counterinsurgency* (Washington, DC: Government Printing Office, 2013), I-3.

³³ *Ibid.*, III-16 – III-17.

³⁴ *Ibid.*, III-18.

³⁵ *Ibid.*, III-16 – III-17.

³⁶ Department of Defense, *Special Operations*, xi.

³⁷ Department of Defense, Joint Publication (JP) 3-22, *Foreign Internal Defense 2010* (Washington, DC: Government Printing Office, 2010), I-1.

³⁸ *Ibid.*, VI-12.

³⁹ *Ibid.*, VI-19.

⁴⁰ *Ibid.*, VI-37 – VI-38.

- ⁴¹ Department of Defense, *Special Operations*, xi.
- ⁴² Ibid., xi.
- ⁴³ Department of Defense, Joint Publication (JP) 3-26 *Counterterrorism* (Washington, DC: Government Printing Office, 2014), III-5.
- ⁴⁴ Ibid., I-5.
- ⁴⁵ Ibid., I-6 – I-7.
- ⁴⁶ Ibid., I-5.
- ⁴⁷ Bard E. O’Neill, *Insurgency and Terrorism from Revolution to Apocalypse*, 2nd ed. (Washington, DC: Potomac Books, 2005), 33.
- ⁴⁸ Max Boot, *Invisible Armies* (New York: Liveright Publishing, 2013), xx.
- ⁴⁹ Ibid., 571.
- ⁵⁰ National Counterterrorism Center.
- ⁵¹ O’Neill, 20.
- ⁵² Ibid., 61-62.
- ⁵³ National Counterterrorism Center.
- ⁵⁴ O’Neill, 24-25, 56-57.
- ⁵⁵ Boot, 571.
- ⁵⁶ Kathryn Gregory, “Ansar Al-Islam (Iraq, Islamists/Kurdish Separatists), Ansar Al-Sunnah,” *Council on Foreign Relations*, 5 November 2008, accessed 20 April 2017, <http://www.cfr.org/iraq/ansar-al-islam-iraq-islamistskurdish-separatists-ansar-al-sunnah/p9237>.
- ⁵⁷ Boot, 529-32.
- ⁵⁸ Ibid., 532.
- ⁵⁹ Ibid., 533.
- ⁶⁰ O’Neill, 21, 61-62.
- ⁶¹ Carla E. Humud, Christopher M. Blanchard, and Mary Beth D. Nikitin, *Armed Conflict in Syria: Overview and U.S. Response* (Washington, DC: Congressional Research Service, 2017), 7.

⁶² Ibid., 7.

⁶³ O'Neill, 21, 56-57.

⁶⁴ Humud, Blanchard, and Nikitin, 8.

⁶⁵ Ibid.

⁶⁶ Ibid., 8-9.

⁶⁷ Council on Foreign Relations, "The Time of the Kurds," 29 July 2015, assessed 4 April 2017, [http://www.cfr.org/middle-east-and-north-africa/time-kurds/p36547#/?](http://www.cfr.org/middle-east-and-north-africa/time-kurds/p36547#/).

⁶⁸ Ibid.

⁶⁹ Lorenz and Erickson, 30.

CHAPTER 2

LITERATURE REVIEW

Introduction

In this chapter, the study will review relevant publications associated to the study's subject and supporting topics. The purpose of the study is to facilitate better understanding of IW within the Tigris and Euphrates watershed by analyzing factors associated with competition for available water within the watershed. This chapter will reinforce the purpose of the study by providing a broad range of scholarly publications that contributed to the research and demonstrate knowledge of other scholarly works within the subjects of water management and competition and IW. The chapter is organized into three subsections: Define the Tigris and Euphrates watershed, Define the value of water, and Doctrinal frameworks of Irregular Warfare and Irregular Warfare Data.

Define the Tigris and Euphrates River Watershed

Frederick M. Lorenz and Edward J. Erickson's *The Euphrates Triangle Implications of the Southeastern Anatolia Project* is the principle source for understanding the impacts of water management policy and projects within the upper Tigris and Euphrates watershed. As discussed in the previous chapter, The Southeastern Anatolia Project (GAP) is the most significant series of dams and water management structures within the Tigris and Euphrates watershed. This comprehensive work frames the politics, economics, security, and legal factors of managing a highly continuous non-navigable inland water way across multiple state boundaries. The work is informative in

nature but contains specific analysis in each chapter concerning a specific dynamic such as politics, economics, etc. Overall, the GAP is an internationally contentious issue that affords Turkey with increased control of the watershed by virtue of Turkey's upstream geographic positioning. There is a general lack of legal frameworks to address inland water way management within the region or at the global level creating a somewhat realist dynamic for the riparian states that manifests itself in generally self-interested behavior. Internal to Turkey, the GAP supports national ideals and goals of increased unity among the Turkish population and increased domestic economic and energy security.

Joost Jongerden's "Dams and Politics in Turkey: Utilizing Water, Developing Conflict," published in the spring 2010 edition of *Middle East Policy Council*, bridges the ten year gap between this research study and Lornez and Erickson's publication. Dr. Jongerden concludes that Turkey is conducting "power politics" in which Iraq and Syria will not receive the water the countries require and thus creating instability.¹ Jongerden's conclusion supports the realist nature of riparian state dynamics within the Tigris and Euphrates watershed. The ability of Turkey to exert influence over Syria and Iraq is multi-faceted. As discussed in chapter 1, Turkey has significant concerns with Kurdish nationalism. Significant Kurdish populations with the watershed located within Syria and Iraq only compound these concerns. At the region level, increased control of the watershed gives Turkey additional influence over regional state politics. Regional power dynamics have been and continue to be fluid. Historical examples of fluid regional dynamics include the pan-Arab movement of the mid-twentieth century, the Arab Israeli conflicts, Cold War era influence, and varying extremist movements within the region.

Greater control of a critical, multi-faceted resource affords Turkey a strong lever to influence regional dynamics in its favor.

The *Inventory of Shared Water Resources in Western Asia* is a comprehensive, multi-organizational scientific study of inland water ways within the Middle East produced by the United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and the Federal Institute for Geosciences and Natural Resources (BGR). Chapters 1 and 3 of study address the hydrology and the impacts of water management practices within the Tigris and Euphrates watershed. The respective chapters analyze the Tigris and Euphrates rivers individually while relating trans-watershed dynamics such as climate change and damming projects as functions of the entire watershed. This study is the foundation of the quantitative data discussed throughout the study concerning dam construction and river flow dynamics. The study's findings regarding significant decreased flows within each river with Syria and Iraq are significant and discussed in depth in chapter 4.

The Euphrates and Tigris River Basin Model (ETRBM) created by Mehmet Kucukmehmetoglu and Jean-Michel Guldmann provides a systems based framework to analyze the dynamics of the watershed. Kucukmehmetoglu and Guldmann presented their model in "Multiobjective Allocation of Transboundary Water Resources: Case of the Euphrates and Tigris," which appeared in the January 2010 edition of *Journal of Water Resources Planning and Management*. In addition to highlighting the pareto efficient nature of the watershed, the model creates critical linkage between the physical volume of water and the derived benefits of water. The model demonstrates a mathematical connection of water volume to municipal, agriculture, and energy related outputs. The

linkage described in the model with additional context provided by multiple United Nations Food and Agricultural Organization publications provided the foundation for the analytic model presented in chapter 4 that relates IW to water competition.

Define the value of water

Jeffrey Vordermark in “Future Conflict- Water as a Strategic Issue,” published in *Through the Joint, Interagency, and Multinational Lens Volume 1.*, asserts multiple points that support this study’s connection of water competition to IW through population. Water crisis competition is a proximate cause for conflict as opposed systemic to another cause of the conflict.² Vordermark’s assertion supports relating a population’s core grievance(s) to water competition and stress creating a causality for IW conflict because of the population centric nature of IW. The threat of non-state actors, to include multiple types of IW groups, to take action to affect water and water infrastructure is substantial and growing in concert with increased water constraint globally. In addition to a potentially catastrophic event on water or water infrastructure, water competition affords an IW group an additional lever within the operating environment that directly affects the population as well as the target government. The increasingly high-payoff nature of water and water related infrastructure warrants analysis. Though James D. Fearon and other’s assertions regarding rational state behavior and water may continue to be valid, understanding water competition in a region dominated by irregular conflict provides relevant academic study to current, challenging security challenges.³ Vordermark also identifies the redistributive nature of water management projects such as dams and irrigation networks.⁴ Supported statistically by Mehmet Kucukmehmetoglu and Jean-Michel Guldmann’s ETRBM, the pareto efficient

nature of the Tigris and Euphrates watershed translates into a net gain or loss to entities, whether nation-states or populations, regarding water management projects. The impacts of territorial gains and losses identified in chapter 4 of this study correlate directly to this point.

“Rationalist Explanations for War,” by James D. Fearon asserts that nation-state versus nation-state conflict directly related to water is unlikely because the high potential for expensive, destructive outcomes outweighs negotiated resolution short of armed hostilities. Fearon shares this view with multiple other scholarly publications. The incident between Syria and Iraq in 1975 referenced in chapter 1 supports this view in that armed conflict was not the most advantageous method to resolve conflict regarding the flows of the Euphrates River. This study seeks to study conflict related to water by actors outside of the rational state actor classification. Fearon’s article appeared in the *International Organization* 49, number 3 in 1995.

“Understanding Environmental Security and Climate Change,” written by Dr. Chris W. King appeared in the January 2014 edition of *Interagency Essay*, a publication by the United States Army Command and General Staff College. This scholarly journal article connects global environmental issues such as climate change, water competition, sea level rise, etc. into the context of U.S. national security matters. The article provides outstanding background on the history of environmental science and the multiple types of environmental advocacy disciplines the science has created. An essential point made by article is that environmental stress can negatively influence a society to the point of

“collapse.”⁵ This point supports the connection of IW and water competition through population.

The Food and Agriculture Organization of the United Nations produces numerous studies and publications regarding food and agriculture policy and production. Food and Agriculture Organization data formed the foundation of this study’s analysis on the value of water. AQUASTAT is the online database of water related analysis produced by the organization and is referenced on multiple occasions regarding water utilization metrics for each of the riparian states of the watershed. Chapter 4 has specific examples of agriculture and water data originating from nation-state governments being skewed by governmental biases. Utilization of data derived from an international organization allowed this study to be as accurate and unbiased as possible.

Fabrice Balanche’s “Water Issues Are Crucial to Stability in Syria's Euphrates Valley” reinforces Dr. King’s points. Published in the 26 May 2016 edition of The Washington Institute PolicyWatch 2622, Balanche’s thesis is that a comprehensive irrigation plan for the Euphrates River Valley in eastern Syria is a requisite plan that should be in place prior U.S./western entities expelling IS from the region. The author also asserts that poor water and agricultural management by the Syrian government created the conditions that lend to the civil unrest beginning the current conflict in Syria. This is one of two principle sources illustrating the connection of water stress and competition to the current IW conflict ongoing in Syria and Iraq.

Francesca De Châtel’s “The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution” adds additional support to the connection of water stress and competition and IW. Appearing in the January 2014

edition of *Middle Eastern Studies*, the author describes the impact of the 2007-2010 draught as an exacerbating factor that led to the economic collapse of the agriculture section in eastern Syria and the following civil unrest. Chapter 4 of this study incorporates multiple specific points of Châtel and Balanche's works

Ali Akanda, Sarah Freeman, and Maria Placht's "The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability" makes similar points as the two previous authors. This work highlights the shift in net food exportation to net food importation within Syria and Iraq. This work appeared in the spring 2007 edition of *al Nakhlah: The Fletcher School Journal for issues related to southwest Asia and Islamic Civilization*. The 2007 publication date presides the 2007-2010 drought referenced previously and supports detailed analysis of the impacts of the drought in chapter 4.

Marie L. Besançon's "Relative Resources: Inequality in Ethnic Wars, Revolutions, and Genocides" is a quantitative based research publication relating intrastate conflict consisting of genocide, ethnic war, and revolution to multiple scholarly based inequality measuring metrics. This article appeared in the *Journal of Peace Research* 42, number 4 in 2005. The methodology of relating socio-economic measures to societal behavior during irregular armed conflict heavily influenced the research methodology and analytic framework within chapters 3 and 4 of this work. This study differs from Besançon's work in that water competition and water stress on the population is the catalyst for changes in the population's behavior that will affect aspects

of IW. Besançon's work uses multiple inequality measures as independent variables and relates them to levels of death and violence as dependent variables.

Doctrinal frameworks of Irregular Warfare and Irregular Warfare Data

Marcus DuBois King, in "The Weaponization of Water in Syria and Iraq" presents an analytic framework relating specific acts that involve water or water infrastructure within the current conflict in Syria and Iraq to specific classifications to characterize the nature of the act. Published in the winter 2016 edition of *The Washington Quarterly*, King's article is a current analysis of water related events and strategies by active IW participants. King classifies specific actions regarding water or water related infrastructure as "Strategic Weaponization, Tactical Weaponization, Psychological Terrorism, Incentivization, and Unintentional Weaponization."⁶ King's framework connects a specific action such as an IW participant manipulating the flows from a dam to achieve a military or economic effect to a greater purpose or intent. This framework significantly influenced the formulation of this study's analytic framework presented in chapter 4 that relates water competition to the strategy, approach, and specific actions of IW participants.

Department of Defense Joint Publications are the foundation for IW definitions and frameworks contained in this study. Military doctrine provides common language and descriptive frameworks for military leaders and policy makers to plan and conduct military operations. Though a constant source of debate in the post 11 September 2001 security environment, IW and its subcategories of COIN, FID, UW, and CT afford multiple methods for the U.S. to utilize military action to execute U.S. policy within

complex operating environment involving state and non-state actors in conflicts that are less intense than Major Contingency Operations. Though inherently from a U.S. perspective, the array of IW missions (COIN, FID, UW, and CT) and the multiple approaches for each (ex. Direct, In-direct, and Combat Operations) are broad enough to ensure this study and its methodology and analysis are not only applicable to U.S. perspectives.

James D. Kiras' *Special Operations and Strategy: From World War II to the War on Terrorism* provides detailed analysis of Special Operations Forces (SOF) conducting IW in the twentieth and twenty-first centuries. Kiras' work is part of the Cass Series on strategy and history and utilizes frameworks and references common to military arts and sciences study. This work helped to expand definitions and application of terminology beyond solely U.S. doctrine uses. Kiras's history spans multiple decades, global dynamics, and geographic areas allowing his audience to see broad commonalities within irregular conflicts. Kiras's work, in addition to Max Boot and Bard O'Neill, provided this work with specific characterizations of multiple aspects insurgency, guerrilla warfare, and terrorism beyond U.S. doctrine.

Invisible Armies by Max Boot is a comprehensive history of IW from ancient history to 2012. Boot's The Invisible Armies Database, referenced in chapter 1, is the basis of this work's understanding of IW within the Tigris and Euphrates watershed accounting for each IW conflict within each of the riparian states. Boot's analysis of the specific conflicts analyzes specific motivations of states, non-states, populations, and leaders of irregular groups. The study also documents the specific aspects of the armed conflict while relating them to the motivations of the participants. Boot reinforces the

idea that terrorism is a tactic and a classification of a group as opposed to a way of war such as insurgency. This idea is critical to this work's analytic framework presented in chapter 4 because it allows one to neutralize the dynamic debate on the definition of terrorism. By treating terrorism as a tactic and a classification, one can still compare different insurgent organizations within the study as opposed to creating a separate category for terrorist organizations.

Bard O'Neill's *Insurgency & Terrorism From Revolution to Apocalypse* is a comprehensive analysis of insurgency and terrorism in the twentieth and twenty-first centuries. Appendix B parts two and three are graphical representations of O'Neill's analysis of insurgency types and insurgent approaches. O'Neill supports the point that terrorism is a tactic allowing insurgencies that employ terrorism to be compared to other insurgencies within this study. O'Neill does not specifically characterize all of the insurgencies within the Tigris and Euphrates watershed described in chapter 1 of this study. However, this study used his specific examples of insurgency types and strategic approaches to characterize each insurgency addressed in this study. O'Neill's examples and definitions heavily influenced the characterization of water competition and water stress presented in chapter 4 of this study.

The "International Water Events Database" is a database that catalogs events regarding international water relations between 1948 and 2008. Aaron Wolf and a team of researchers from Oregon State's College of Earth, Ocean, and Atmospheric Sciences compiled the data to document events in areas where water was a "scarce or consumable resource or as a quantity to be managed."⁷ Analyzed in detail in chapter 4 and appendix C, Wolf's database supports the assertion that rational nation-states are unlikely to

engage in military hostilities to resolve water and water management disputes. The same dataset that represents armed conflict regarding water or water management is consistent with King's "Weaponization of Water" categories with historical examples spanning multiple conflicts. Wolf's data also supports the point that water quantity is the predominant source of friction within the Tigris and Euphrates watershed. This study contains multiple specific events that would add additional post-2008 data points to Wolf's ongoing work.

William Lyons's "A New Strategic Framework: Development as an Instrument of American Power," appeared in the January 2015 *Inter Agency Essay*. Building upon guidance in the Obama Administration era National Security Strategies (NSSs) and Quadrennial Defense Reviews (QDRs), Lyons advocates for a development focused instrument of national power that seeks to minimize the chances of environmental conflict through increased development. Though this study is not predictive nor is it perspective to a specific policy, Lyons identifies a critical component of conflict resolution within the Tigris and Euphrates watershed. Whether a function of the international community or organic to the riparian states, specific agreements regarding water apportionment and flow and reconstruction and maintenance of water management infrastructure are requisites for sustainable conflict resolution.

¹ Joost Jongerden, "Dams and Politics in Turkey: Utilizing Water, Developing Conflict," *Middle East Policy Council* 17, no. 1 (Spring 2010): 4, accessed 5 November 2016, <http://mepc.org/journal/middle-east-policy-archives/dams-and-politics-turkey-utilizing-water-developing-conflict>.

² Jeffrey Vordermark, "Future Conflict- Water as a Strategic Issue," in *Through the Joint, Interagency, and Multinational Lens Volume 1*, edited by David A. Anderson and Heather R. Karambelas (Fort Leavenworth, KS: US Army Command and General Staff Press, 2015), 85.

³ Ibid., 88.

⁴ Ibid., 90.

⁵ Dr. Chris W. King, “Understanding Environmental Security and Climate Change” (Interagency Essay No. 14-01W, Simon Center, Fort Leavenworth, KS, 2014), 1, 8.

⁶ Marcus DuBois King, “The Weaponization of Water in Syria and Iraq,” *The Washington Quarterly* 38, no. 4 (Winter 2016): 157.

⁷ Aaron Wolf, “International Water Event Database: 1950-2008,” Transboundary Freshwater Dispute Database, College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, accessed 27 February 2017, <http://www.transboundarywaters.orst.edu>.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

In this chapter, the research design and methodology with underlying assumptions will be presented. The research methodology will facilitate better understanding of IW within the Tigris and Euphrates watershed by defining the framework to analyze factors associated with competition for available water within the watershed to IW. The research procedure will outline specific data collection measures for specific types of data referenced/used in the study followed by suitability measures linking the research methodology back to the research problem. Finally, this chapter will define analysis parameters and metric standards for evaluating water competition within the watershed with casual effects on IW.

Design

This study will define the value of water flowing through the Tigris and Euphrates watershed in terms of drinking water/sanitation, agriculture yields, hydroelectric outputs, and industrial outputs. These derived benefits of water represent specific aspects of utility to populations and entities within the watershed. Changes to the flow of water will impact the derived benefits of water and the water's utility. This study will then analyze actions by state and non-state entities that increase/decrease the amount of water accessible to indigenous populations within the Tigris and Euphrates watershed and corresponding increases/decreases in water dependent functions listed previously. IW being population centric will be directly affected by competitive actions that change water availability to

specific populations. By showing a connection between river competition and impacts to IW, the study will help to provide increased understanding of conflict dynamics within the Tigris and Euphrates watershed.

Methodology

This research is a mixed method case study utilizing quantitative and qualitative data gathered through archival research. Existing quantitative spatial data will be used to define the volume of water following through the respective watersheds and the effects of existing manmade water management structures such as dams and reservoirs on the availability of water to specific populations within the watersheds. Existing archival quantitative data will be used to show changes in the value based outputs of water throughout the watersheds and its effect on associated populations. Qualitative metrics and frameworks defining IW and its subsets will be used to connect effects on the associated populations to effects on IW conflicts. The qualitative evaluation of IW metrics will be multifaceted and broadly focused. Availability of water will have indirect effects on IW conflict through its effect on the population, as well as, effects on the conduct of IW such as a group utilizing conflict to take control of a portion of land because of its advantageous position to water.

Research Procedure

The researcher utilized data from the United States Geological Survey, the United States Army Corps of Engineers, and the United Nations-Economic and Social Commission for Western Asia to define the amount of water available for use within the Tigris and Euphrates watershed and effects manmade structures that influence

apportionment of the water. This data was gathered through static monitoring systems located throughout the watershed. The researcher utilized agricultural and hydroelectric data gathered from multiple sources. This data was compiled through various means that included government reporting, international organization monitoring/estimations, and independent research. The researcher utilized unclassified news and reporting sources for data relating to the current conflicts in Iraq and Syria. These sources utilize a variety of means to compile data such as social media, government statistics, and news reporting to produce quantitative and qualitative conflict measures.

Suitability

The design and methodology appropriately addresses the purpose of the research because it analyzes the value of water to the population of the Tigris and Euphrates watershed and identifies causal relationships of conflict to water competition as opposed to looking at water conflict as systemic of social, religious, or political causes. Understanding causal factors within a human population is directly related to understanding impacts and manifestations of the human population in irregular warfare conflict(s). The study focused on post 2003 studies of the Tigris and Euphrates watershed and changes to the drinking water/sanitation, agriculture yields and industrial/hydroelectric outputs. Surface water within the Tigris and Euphrates watershed was studied. Surface water, defined by the United States Geological Survey, is water contained within the rivers, streams, and reservoirs of the watershed.¹ Though significant

ground water resources exist in the Tigris and Euphrates watershed, the vast preponderance of competition exists within surface flows.

Analyses and Standards

Relational analysis between water competition and IW participants was conducted. Water competition is defined as actions taken by an entity that change the apportionment of surface water within the Tigris and Euphrates watershed. Changes to the amount of water available will impact the derived benefits of water and water's utility to the population. Effects on the population will have specific effects on IW because of the population centric nature of IW. IW is a U.S. military doctrinal encompassment of COIN, FID, UW, and CT.

IW participants include the insurgency(s), the nation-state government targeted by the insurgency, and third-party support. O'Neill's terminology will characterize an insurgency's type and strategic approach. U.S. joint doctrine will characterize nation-state government and third-party support strategic decisions and approaches. The type/strategy and approaches of IW participants will be reflected in the specific actions. Specific actions within an IW conflict that are relevant to this study are those actions that effect the control or influence of water apportionment or the means to utilize the water for utility benefit. Changes and effects on IW participant type/strategy, approach, and action(s) as a result of water competition were analyzed and presented.

Relational analysis of current conflict in Iraq and Syria was conducted. Because of the multifaceted nature of the conflict in Iraq and Syria and various types of regional and extra-regional government actions in the region, the researcher will analyze impacts

of water resource competition by specific groups to include: Kurdish groups, Islamic State, and Syria rebel groups.

¹ United States Geological Survey (USGS) Water School, “Water Science Glossary of Terms,” October 2016, accessed 17 November 2016, <http://water.usgs.gov/edu/dictionary.html>.

CHAPTER 4

ANALYSIS

Introduction

The purpose of this chapter is to present the analysis and findings of the study. The chapter is divided into four sections. The first will present the findings of the study and ultimately address the primary research question: what is the role of water competition within the Tigris and Euphrates watershed as a driver of IW? Following the findings, the next three sections will analyze the study's subsidiary research questions and provide the analytic support to the findings. This chapter will establish a better understanding of IW within the Tigris and Euphrates watershed by analyzing factors associated with competition for available water within the watershed.

Findings

The primary question of this study is: What is the role of water competition within the Tigris and Euphrates watershed as a driver of IW? This question relates the concepts of water competition to IW through the connection of population. Water competition will have effects on the population that will in turn drive specific aspects of IW. Drivers as it relates to IW will be applied in multiple circumstances. In the most broad/macro sense, a driver of IW will be a critical component explaining why there is an IW conflict in existence. Driver of IW will also be applied to examine specific aspects and parts of IW such as insurgent type and strategy, state and third party support strategy and approach. At the most specific level, drivers of IW will be used to characterize specific actions

taken by participants within an IW conflict that relate to controlling the water resources of the Tigris and Euphrates watershed and the derived benefits of these water resources.

Table 1. Irregular Warfare-Water Competition Relational Framework

Water Competition and Irregular Warfare (IW)					
Aspects of Water Competition			IW Participants		
Water Competition on Populations/Participants ->			Insurgency	State	Third Party Support
Water Competition Effects on Type and Strategy ->			Type	Strategy	Strategy
Water Competition Effects on Approach ->			Approach	Approach	Approach
Control Rivers and Reservoirs			Actions taken by the insurgency to seize, gain control, disrupt, and/or leverage the physical body of water (rivers and reservoirs), dams and flow regulation implements that apportion water, or specific systems that effect the derived benefits of water.	Actions taken by the state to retain, control, secure, and/or leverage the physical body of water (rivers and reservoirs), dams and flow regulation implements that apportion water, or specific systems that effect the derived benefits of water.	Actions taken by third party actors to enable or disrupt participants within an IW conflict to achieve their desired goal as it relates to water.
Control of Dams/Flow Regulation					
Actions to Effect Deprived Benefits of Water by use classification:	Agriculture	Water Transport			
		Water Dispersion			
	Municipal	Water Treatment			
		Water Transport/Distro			
	Industrial	Water Transport			
		Facility of Use			
	Hydroelectric	Power Generation			

Source: Graphic developed by the author based on research of the derived benefits of water to human populaces.

Table 1 is a graphical representation of the relational approach used to connect water competition and IW. The study's findings will correspond to table 1 from top to bottom addressing applicable IW participants. Table 1 is a broad framework to understand the relationship of water competition to IW in general as opposed to the specific example of the Tigris and Euphrates watershed. Thus, not every aspect of the framework will have a relevant example within the study. When addressing the actions of IW participants, the table begins with two broad categories corresponding to the physical

control of territory around the rivers and reservoirs within the watershed and to control over dams and infrastructure that regulates flow of the watershed. The four categories of derived benefits of water provide more narrow categories to characterize specific actions. “The Value of Water” subsection analyzes and defines water use categories in detail later in the chapter.

Water Competition Effects on Type/Strategy of IW Participants

The geographic calculations of IS were directly influenced by the water stressed effects on the Syria populace. The separatist type of insurgency adopted by IS contrasted with its prior manifestation in Iraq during the Iraq insurgency and the Muslim Brotherhood insurgency in Syria. By declaring a caliphate and assuming state-like control of its territory in Iraq and Syria, IS directly addressed the core grievances of the local population outlined in the “Water Stressed Populace and IW” subsection. The effectiveness and relevance of this strategy is best represented by the composition of IS fighters being 60-70 percent from eastern Syria.¹ Because separatist insurgencies attempt to establish a region of control disassociated from the state, they must subsume governmental responsibilities to a greater extent than other types of insurgencies. Because of the importance of water to the local populace of IS’s territorial holdings, IS established a department of water and agriculture to fill the role previously held by the Syrian government.² In terms utilized by Marcus Dubois King’s framework, IS through its physical/military control and state-like administrative control is able to achieve psychological effects on the population through incentives and coercion. IS is attempting to address core grievances through water management as well as coercively influence

other actors such as the government of Iraq through the interconnected nature of the watershed.³

Water resource competition has also effected the COIN strategy of the Syrian government, specifically in prioritization of territory the Syrian government has sought to retain. A subsidiary research question discusses the background of this point in further detail later in the chapter. One could argue that the unsustainable water management situation in eastern Syria made this region a lower priority for Syria government defensive and counteroffensive operations. There are significant ethno-religious factors affecting the Syrian government's strategic calculus, however, water constrained factors in the region increase the difficulty for the Syrian government to reestablish governmental control of the region.

Iraq's strategy to combat IS and restore the territorial integrity of Iraq is in part a function of water competition. The rapid expansion of IS in Iraq in the summer of 2014 collapsed the Iraqi security force apparatus in large portions of northern and western Iraq. During this period, the viability of the Iraqi government and the sustainability of the territorial bounds of Iraq were seriously questioned by the international community. The situation in Iraq in 2014 mirrored several factors outlined in appendix B "Insurgency Outcome Indicators" indicating a negotiated settlement or insurgent victory was likely. From a water competition perspective, Iraq could not afford an extremist adversary to control the upstream portions of the Tigris and Euphrates watershed in Iraq and the corresponding dams and ability to manipulate river flows.

The willingness of Shi'ite militia groups willing to fight along with uniformed Iraqi Security Forces in traditionally Sunni controlled portions of northern Iraq is in part

motivated by water competition for the Tigris River. The Saddam government withholding water from Shi'ite areas in southern Iraq during the post-Gulf War Shi'ite insurgency, IS manipulating Euphrates River flows into southern Iraq, and the catastrophic potential of a Mosul Dam failure are specific examples that motivate these groups to fight outside of their traditional ethnic regions. Other political factors are a function of this dynamic, however, the interconnected nature of the watershed and the unacceptability of IS control of the watershed is significant to Shi'ite militia motivations.

Lack of water competition has had a moderating effect on relations between the Kurdish Region of Iraq and the Iraqi central government. By virtue of being located in the upstream portions of the Tigris watershed with corresponding Mediterranean rainfall patterns, the Kurdish Region of Iraq does not have a water competition related need to expand its control or exploit central government of Iraq's lack of control in northern Iraq for water related objectives. Though relations between the Kurdish Region of Iraq and the Iraqi government are extremely multi-faceted, water security in the case of the Kurds is a contributing factor to generally supportive security operations to counter IS in northern Iraq.

Water Competition Effects on the Strategic Approach of IW participants

Utilizing O'Neill's framework depicted in appendix B "Insurgency Approaches," one could argue that IS is using aspects of the protracted popular war approach in addition to a military-focused strategy. The key component of IS's hybrid approach is its emphasis on providing "social service" to the population.⁴ Principal among these services is water management. Protracted popular war differs from a military-focused strategy in

that protracted popular war places the political ideology of the insurgency paramount above all other components to include military operations. Linked to the separatist type of insurgency, IS's ideology has political/governmental functions in addition to its religious ideology.

For the purposes of this study, the United States is a third party participant conducting FID and CT in Iraq to enable the government of Iraq to defeat IS and restore the territorial integrity and governmental control of Iraq. Conducting combat operations, as opposed to indirect or direct approaches, with U.S. aircraft and Special Operations Forces is a specific approach of FID. Partnered nation CT operations are a specific approach to CT. Operations to enable Kurdish security forces to seize Mosul Dam in northern Iraq from IS forces in August 2014 was one of the initial FID and CT operations conducted by the U.S. in the current conflict.⁵ Though these operations were conducted to prevent a catastrophic failure or sabotage event on the dam that would have decimated central Iraq with flood water, it represents a significant act to regain control of water infrastructure. The U.S. conducted similar operations in support of Iraqi Security Forces to prevent IS from seizing the Haditha Dam in 2014.

Water Competition on the Actions of IW Participants

The "A Riparian Islamic State" subsection of this chapter discusses the expansion of IS in the spring and summer of 2014 in detail. This period was the peak of IS territorial control. During this time, IS controlled 100 percent of the Euphrates River within Syria and approximately 50 percent of the Khabor and Balikh Rivers, each tributaries of the Euphrates River in Syria. In Iraq, IS controlled 100 percent of the Euphrates River upstream from Fallujah except for the Haditha Dam. IS controlled the Tigris River

between Mosul and Samarra. In terms of control of the Tigris and Euphrates watershed, this event was the largest reapportionment of the watershed since the fall of the Ottoman Empire.

Table 2. Irregular Warfare-Actions and Dams

Country	River	Dam Name	Events	Source
Iraq	Euphrates	Ramadi	IS seized and controlled the dam May 2015	1
Syria	Euphrates	Tabqa	IS seized the facility in July 2013; Syrian Kurdish forces secured the dam late March 2017	2
Iraq	Euphrates	Fallujah	IS seized and controlled the dam April 2014; IS has manipulated water flow on multiple occasions; Recaptured by Iraqi Security Forces on 15 June 2016	1
Iraq	Euphrates	Haditha (Al Qadisiyah)	IS conducted multiple operations to seize the facility June to August 2014; Prevented by Iraqi security forces and U.S. airstrikes	1
Iraq	Tigris	Sudur Dam	IS seized and controlled the dam 09 July 2014; Iraqi Security forces secured the dam on 23 January 2015	1
Syria	Euphrates	Baath	IS seized and controlled dam since January 2014	4
Syria	Euphrates	Tishreen	Syrian opposition group seized the facility on 26 November 2012; 26 December 2015 Syrian Kurdish forces secured the dam.	3
Iraq	Tigris	Mosul Dam	IS seized and controlled 03-08 August 2014, Kurdish security forces regained control enabled by U.S. airstrikes 18 August 2014	1
1. Erin Cunningham, "Islamic State Jihadists Are Using Water as a Weapon in Iraq," <i>Washington Post</i> , 07 October 2014, access 15 April 2017, https://www.washingtonpost.com/world/middle_east/islamic-state-jihadists-are-using-water-as-a-weapon-in-iraq/2014/10/06/aead6792-79ec-4c7c-8f2f-fd7b95765d09_story.html?hpid=z1&utm_term=.d1af8b410504				
2. David Axe, "ISIS Could Kill Thousands With 'Biblical' Weapon," <i>Daily Beast</i> , 31 March 2017, accessed 15 April 2017, http://www.thedailybeast.com/articles/2017/03/31/isis-could-kill-thousands-with-biblical-weapon				
3. Suleiman Al-Khalidi, "U.S.-backed alliance Captures Key Dam From Islamic State," ed. Andrew Roche and Hugh Lawson, <i>Reuters</i> , 26 December 2015, accessed 15 April 2017, http://www.reuters.com/article/us-mideast-crisis-syria-alliance-idUSKBN0U90DE20151226				
4. Sarah Almukhtar, Tim Wallace, and Derek Watkins, "ISIS Has Lost Many of the Key Places It Once Controlled," <i>New York Times</i> , 03 July 2016, accessed 15 April 2017, https://www.nytimes.com/interactive/2016/06/18/world/middleeast/isis-control-places-cities.html?_r=1				

Source: Produced by the author based on information from multiple sources annotated in the table.

The expansion of IS territorial control included the seizure and control of the dams described in table 2 above. The seizure and control of critical infrastructure, to include dams and hydroelectric facilities, is a significant change when compared to previous IW conflicts within the Tigris and Euphrates watershed. The "Database Analysis" section of the chapter discusses in detail IW events that relate to water

competition. Because of the dynamics of the Tigris and Euphrates watershed discussed in chapter 1 and in the “Source of Competition” subsection of this chapter, control of dams/flow regulation is essential to apportionment of water even beyond physical control of the terrain surrounding the rivers and reservoir of the watershed. This level of control has enabled IS to use coercive measures to influence populations within and outside IS territorial control.

Within the Marcus DuBois King’s framework, manipulating water flows would constitute utilization of water as a weapon. Releasing water from the Fallujah Dam in the spring of 2014 to impede Iraqi Security Force operations in vicinity of Fallujah and the disruption of flowing water to Baghdad and the Shi’ite dominated areas of Iraq are examples of utilizing water as a weapon.⁶ A less dramatic example occurred north of Baqubah, Iraq in which IS manipulated the Sudur Dam to intentionally flood downstream agricultural activities.⁷ The most profound form of “weaponization of water” would be intentional destruction of a dam forming a large reservoir such as the Mosul, Haditha, Tishreen or Tabqa Dams.⁸ As discussed previously, Kurdish security force operations enabled by U.S. airstrikes were in direct response to this contingency.⁹

In addition to gaining physical terrain, IS military actions allowed the organization to control the derived benefits of water within significant portions of Syria and Iraq. During the summer of 2014, IS controlled 40 percent of Iraq’s wheat production capacity through its control of the means to transport and disperse water for agricultural use as described in table 1.¹⁰ A corresponding and creditable measure does not exist for Syria. Based on analysis in the “Water Stressed Populace and IW” subsection of this chapter, one can estimate that IS controls a majority of the wheat and grain production

capacity of Syria. The localized nature of municipal water infrastructure such as pump stations and treatment facilities places population within IS controlled areas dependent on the organization for water for consumption and sanitation purposes. IS controls 18 percent of Syria's total electricity generation capacity through its control of the Tishreen, Tabqa, and Ba'ath dams along the Euphrates River.

The following sections will analyze the study's three subsidiary research questions and provide additional context to the above findings. Most of the findings associated with actions of IW participants and their significant related most closely to "The Value of Water" subsection. "Sources of Competition" explains the significance of the watersheds dams as they related to water apportionment. This analysis leads to discussion regarding water related events within the watershed throughout the twentieth and twenty-first centuries. Ultimately, this section provides context for the significant of the IS territorial expansion within the watershed in 2014. The "Water Stressed Populace and IW" subsection outlines specific climatic and geographic factors within the watershed as they relate to water and agriculture dynamics. These factors were compounded and exacerbated by the region-wide drought between 2007-2010 and were the single largest contributor to the requisite vulnerability of the populace to insurgent participation.

The Value of Water

This section will analyze subsidiary research question one: what is the value of water to the human populace? This section will analyze each classification of water use by subsection and include the following: agriculture use, municipal use for drinking water and sanitation, industrial uses, and energy production. These classifications are the

standard water use classifications used to analyze water utilization at the national, regional, and municipal levels. Each subsection will analyze each use classification for the three riparian states and equate value in multiple forms such as economic outputs, functional outputs, employment, and social utility.

Agriculture

The first and most significant water use classification is agricultural use. In the Tigris and Euphrates watershed, much like most of the world, agricultural related water usage comprises the largest portion of overall water utilization. Within the agricultural water use classification, irrigation is typically the dominant use as opposed to livestock watering. There are two significant environmental factors that increase the importance of the Tigris and Euphrates watershed in terms of irrigation.

The first is the dynamics of climate within the region. The Tigris and Euphrates watershed lies within three climatic zones based on the Köppen climatic system. The largest climatic zone in terms of land area is semiarid/steppe. This portion of the watershed is located in central Turkey and central Iraq characterized by a broad range of temperatures with rainfall occurring during the winter months. Summer months with this climatic zone are generally dry. Eastern Syria and western Iraq are arid/desert consisting of year round high temperatures and low levels of rain fall. Eastern Iraq, northern Syria, and southeastern Turkey are Mediterranean and comprise the headwaters of the Tigris and Euphrates Rivers. Mediterranean climatic zones consist of hot dry summers and wet cool winters.¹¹ Throughout the Tigris and Euphrates watershed seasonal rainfall varies from year to year increasing the frequency of droughts during the primary growing season between late spring and early fall.¹² Additionally, the vegetation and soil

composition within these climatic zones increase water evaporation rates. High evaporation rates decrease the volume of water that can be utilized for human use. The climatic and physiologic conditions within the Tigris and Euphrates watershed create an environment where agricultural production is heavily dependent on irrigation from surface (Tigris and Euphrates watershed flows) and subsurface (sub-terrain aquifers) to sustain crop cultivation and livestock during the growing season and from year to year.

The second factor is the rapid growth of the population in the region during the second half of the twentieth century in which the population of the world nearly doubled.¹³ The population of the Middle East and North Africa grew by 380 percent during this time, almost four times the global average.¹⁴ Globally, caloric per capita intake increased during this period and increased in the Middle East and North Africa by approximately 30 percent. The significant population growth and rise in caloric intake greatly increased the levels of agriculture production required to sustain the region's population.¹⁵ At the global level, estimates suggest that there is approximately one tenth of the required food supply to feed the human population without agriculture activity.¹⁶ Agriculture, or human action to develop land, plants, and animals for human use, has expanded the natural human carrying capacity of the earth since pre-historic times. There are three ways to increase food production: increase arable land, increase yield per unit area, and "increasing cropping intensities (multiple cropping and shorter fallow periods)."¹⁷ Within the Tigris and Euphrates watershed increasing irrigation was the primary method to address these agriculture expansion methods as opposed to land transformation such as deforestation. Increasing irrigation expanded arable land through the artificial introduction of requisite water for agricultural production and increased crop

yields by sustaining consistent water availability during growing seasons. The numerous damming and irrigation projects pursued by Turkey, Syria, and Iraq described in chapter 1 are consistent with the respective governments attempting to increase food production for growing populations. Figure 8 is a geographic depiction of the distribution of irrigated land within the Tigris and Euphrates watershed. The zones of irrigation depicted in figure 8 correspond to the semiarid/steppe climates of southeastern Turkey, eastern Syria, and central/southeastern Iraq that require irrigation to supplement seasonal rainfall for sustained agricultural production.

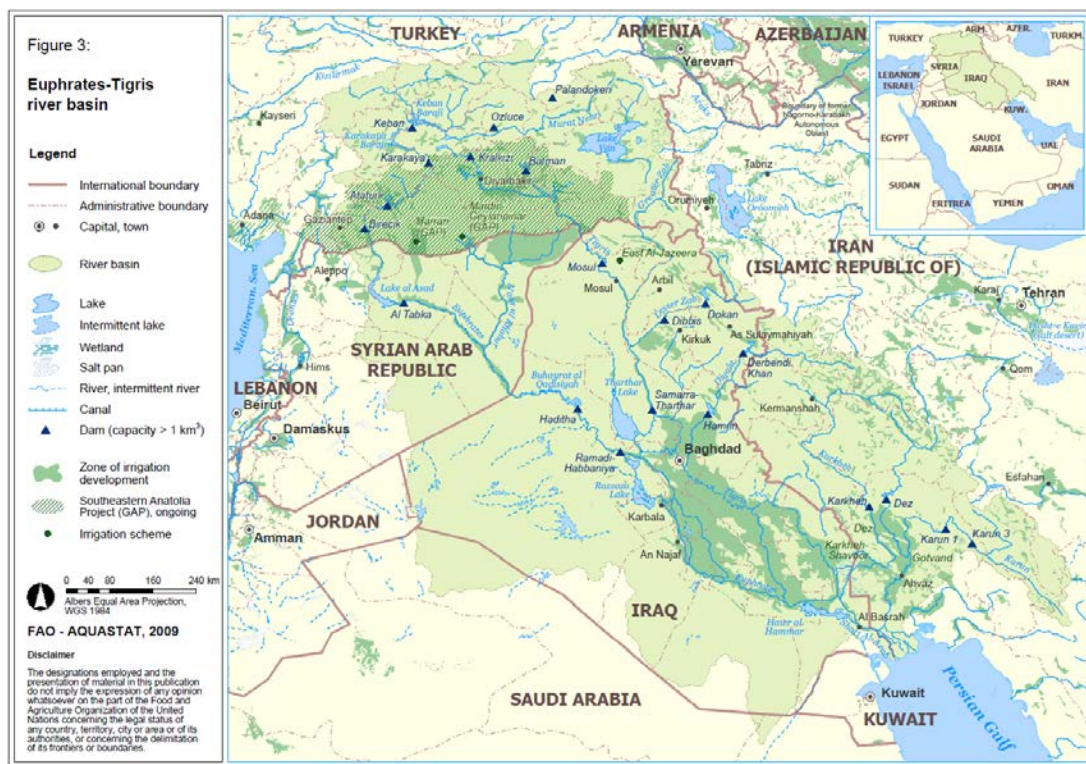


Figure 8. Irrigation Zones within the Tigris and Euphrates Watershed

Source: Food and Agriculture Organization of the United Nations, “Euphrates-Tigris River Basin Map,” AQUASTAT Maps and Spatial Database, assessed 1 April 2017, http://www.fao.org/nr/water/aquastat/basins/euphrates-tigris/Euphrates.tigris-map_detailed.pdf.

At the national/macro level expressing agriculture water use in agriculture production as percentage of Gross Domestic Product (GDP) indicates the economic value of national agriculture production relative to a country's gross economic production in all sectors of the economy. Overall, there is a downward trend in the agriculture production as percentage of GDP within the riparian states. In Syria, agriculture production was 30 percent of GDP in 1990, 24 percent in 2000 and 18 percent in 2014. In Turkey, agriculture production was 18 percent of GDP in 1990, 11 percent in 2000 and 8 percent in 2014. Estimates for Iraq were between 8-9 percent during this period. For reference, the world maintained a 4 percent agriculture production level between 2000 and 2014.¹⁸

The percentage of population employed in agriculture experienced a downward trend consistent with agricultural production as a percentage of GDP. In Syria, 31.1 percent of the population was employed in the agriculture sector in 1990, 32.9 percent in 2000, and 14.3 percent in 2014. In Turkey, 46.9 percent of the population was employed in the agriculture sector in 1990, 36 percent in 2000 and 23.6 percent in 2014. In Iraq, 23.4 percent of the population was employed in the agriculture sector in 2014 following an estimated decrease during the previous decade. For reference, the world figures were 35.3 percent in 1990, 38 percent in 2000 and 30.7 percent in 2014.¹⁹

The 18.6 percent drop in agricultural employment in Syria is significant. Most of the decrease in the agricultural sector employment occurred in eastern Syria within the Euphrates watershed. The "Water Stressed Populace and IW" subsection of this chapter will expand on this drop in agricultural section employment. Turkish agriculture economic output and employment figures reflect national trends and are consistent with industrializing countries. Employment, regional economic output, and regional

import/export figures are consistently lower within the GAP provinces when compared to Turkish national figures during the last decade.²⁰ Additionally the GAP provinces experienced a net negative migration rate during the last decade.²¹ The trends indicate that negative changes to the agriculture sector are having disproportionately larger impacts within the GAP provinces.

In addition to producing economic outputs and employment, agriculture production provides food stuffs to populations. During the second half of the twentieth century and into the twenty-first century, the Turkish, Syrian, and Iraqi governments placed significant emphasis on being self-sufficient countries in terms of food production.²² Total cereal production is an essential metric for studying agriculture production. A majority of human caloric intake comes from cereals. Cereals also have derivative impacts on other food sources such as livestock. Within the Tigris and Euphrates watershed, wheat and barley are the predominant cereal crops. Wheat and barley crop cycles that require consistent water throughout the growing season beginning in late winter and extending into early fall and require the irrigation infrastructure referenced previously. Despite the damming and irrigation projects executed through the twentieth and twenty-first centuries and the emphasis on agricultural self-sufficiency, Turkey, Syria, and Iraq became net cereal importers during the early 2000s.²³ This is a significant indicator of food supply vulnerability. The United Nations Food and Agricultural Organization (FAO) uses three indicators to assess vulnerability food supply: cereal import dependency ratio, percentage of arable land equipped for irrigation, and Value of food imports over total merchandise exports.²⁴ The shift in cereal importation directly effects the first indicator. Dependency on imported cereal will either increase

with growing populations. The shift in net cereal importation adds significance to the pareto efficient nature of the watershed. Irrigation infrastructure can be expanded however available water from the Tigris and Euphrates watershed cannot be expanded. Cereal importation impacts the third indicator by increasing the burden of other economic activity to support cereal importation.

By nature of its geographic positioning in the upstream portions of the watershed and ability to expand GAP irrigation projects, Turkey has the greatest capacity to expand water use within the agriculture sector to secure its domestic food supply. However, increased utilization of water within the Tigris and Euphrates watershed negatively impacts available water downstream in Iraq and Syria. Assessing food supply vulnerability in Iraq is multi-faceted because of the constant conflict in the country since 2003. Iraqi agriculture within the Euphrates portion of the watershed is potentially limited by upstream utilization and decreasing water volumes. The “Water Stressed Population and IW” subsection of this chapter provides detailed analysis on the impact of net cereal importation and failed Syrian government water management and agricultural practices.

Municipal

Municipal water use is the utilization of water for sanitation, consumption, and cooking purposes. Examining municipal water use in terms of percentage access of the population to improved water sources provides insight into access to water sources as well as water treatment facilities to ensure water is safe for human use and consumption. In Iraq, 78.3 percent of the population had access to improved water sources in 1990, 80.1 percent in 2000, and 85.4 percent in 2014. In Syria, 85.7 percent of the population

had access to improved water sources in 1990, 87.5 percent in 2000, and 90.1 percent in 2014. In Turkey, 85.4 percent of the population had access to improved water sources in 1990, 92.8 percent in 2000, and 99.7 percent in 2014. For reference the world statistics during the same years were: 78.5 percent, 83 percent, and 88.7 percent respectively.²⁵ At the national level, the populations of the Tigris and Euphrates watershed have experienced an overall increase in access to improved water sources. Municipal water represents the lowest percentage of use classification within each riparian state.²⁶ The critical vulnerability is the water treatment and distribution facilities. Municipal water use has a high rate of return flow in that treated waste water can be returned to the system for use in additional sectors or by a downstream entity. Though not as vulnerable to quantity issues, increased utilization of water stresses infrastructure to ensure water quality is not impacted. Downstream populations and entities are inherently impacted by water quality issues especially in the municipal use category.

Hydroelectric

Megawatts (MW) is the unit of measure used throughout this section to express quantities of power. As discussed in previous sections, the expanding population of Turkey, Syria, and Iraq created increased electricity demands. In addition to irrigation and flow regulation, the damming projects within the Tigris and Euphrates watershed created hydroelectric power generating capacity to help meet the growing power demands of the respective countries.

Turkey has nine hydroelectric dams within the Tigris and Euphrates watershed. Seven of the nine hydroelectric dams are a part of the GAP project; the Keban and Ozluce hydroelectric dams are located on the Euphrates River upstream of the territorial

boundaries of the GAP. In addition, to hydroelectric dams, Turkey constructed three hydroelectric power plants on canals that use flowing river water to produce electricity as opposed to reservoirs created by dams.²⁷ In 2014, Turkey had 23,643 MW of hydroelectric production capacity nationwide. The nine hydroelectric dams and three hydroelectric canals within the Tigris and Euphrates watershed had a total capacity of 7038 MW representing 29.8 percent of total hydroelectric power generating capacity for Turkey and 10.1 percent of total electrical generating capacity (all forms of generation).



Figure 9. Turkish Hydroelectric Power Plants with the Tigris and Euphrates Watershed

Source: Graphic built by author in Google Earth® based on data derived from United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 63, 113, and 115.

As described in chapter 1, the GAP is a multi-faceted regional development program that is intended to expand economic and social opportunity within Turkey's most underdeveloped region. The damming and irrigation projects of the GAP are the

building blocks of the greater regional development program. The GAP Action Plan 2014-2018 outlines numerous increases in regional domestic product, increases in manufacturing, and state and foreign investment in the region. Of the three riparian states, Turkey has the most quantifiable primary and secondary benefits of hydroelectric power generation within the Tigris and Euphrates watershed.²⁸

The three Syrian hydroelectric dams on the Euphrates River comprise all of Syria's hydroelectric power generation. The full capacity of the dams is 1505 MW representing 18 percent of total Syrian electricity generating capacity. Of note is the Syrian Government's self-imposed limits on hydroelectric power generation at the Taqba and Baath dams. Since 2007, the Syrian hydroelectric generation capacity has been between 850-900 MW. This is a function on the amount of water the Syrian Government was willing to release through the dams as opposed to the actual generation capacity of the facilities. This is indicative of several water-related policy changes Syria implemented between 2007-2010 during a severe, multi-year drought. This study will expound on the effects of this drought in the final section of this chapter. The Syrian Civil War has had dramatic effects on total power generation. Between 2010-2014, there has been a 53 percent decrease in total Syrian electricity generation. However, estimates for hydroelectric generation remained at pre-war levels during this period.²⁹



Figure 10. Syrian Hydroelectric Power Generating Facilities

Source: Graphic built by author in Google Earth® based on data derived from United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 63, 113, and 115.

Iraq has ten hydroelectric facilities, and all are located within the Tigris and Euphrates watershed. In addition to the hydroelectric facilities, the Erbil Power Plant is a combined cycle thermal plant that draws water for steam turbine electricity production from the Lesser Zab River.³⁰ In 2014, Iraq had 2,513 MW of hydroelectric production capacity and 1,500 MW generating capacity from the Erbil Power Plant. The combined total represents 21 percent of Iraq's total 19,153 MW electricity generating capacity. Since the U.S. led invasion of Iraq in 2003, Iraq has been importing electricity to meet

short falls in demand due to a general decline in overall electrical generation. Between 2004-2014, Iraq has increased its electricity imports by 87 percent.³¹



Figure 11. Iraqi Hydroelectric Power Generating Facilities

Source: Graphic built by author in Google Earth® based on data derived from United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 63, 113, and 115.

Hydroelectric power represents a significant portion of each riparian state's energy generation capacity. Turkey, Syria, and Iraq manage their respective hydroelectric facilities as public utilities. Meeting electricity demands of the population is a function of

government performance and impacts individual citizens as well as national economy. Ineffective management or loss of physical control of a hydroelectric facility has multiple effects on the population that include eroded confidence in the government, negatively impacted individual quality of life, and decreased economic capacity are examples . Conversely, positive hydroelectric management within the GAP has spurred increased economic development and quality of life increases.³²

Industrial

Industrial uses for water include those activities that require a specific volume of water for operation or production. The Food and Agriculture Organization's AQUASTAT database produces water use profiles at the national level and categorizes water use into municipal, industrial, and agricultural categories. Hydroelectric is omitted because of the essentially 100 percent rate of return flows to the water system. Current industrial use percentages for each riparian state are: Turkey 11 percent, Syria 4 percent, and Iraq 15 percent. Industrial uses of water in Turkey and Syria did not significantly impact this study because of the geographic separation of each state's urban and manufacturing sectors from the Tigris and Euphrates watershed. All of Iraq's significant population and industrial centers are within the watershed. The relation of agriculture use and food security to industrial use in Iraq is of concern. If water quantity issues limit agriculture production, the same water quantity issues can impact industrial use creating competition within Iraq as well as competition with the other riparian states for water volume. Due to the persistent conflict in Iraq since 2003, there is not significant data to

further investigate this point. However, based on water use profiles and observed trends in the watershed this relation is valid.

Sources of Competition

In this section, the study will analyze subsidiary research question two: what are the sources of competition for the flows of the Tigris and Euphrates Rivers? This subsidiary research question addresses the dynamic of competition because it connotes that the flows of the Tigris and Euphrates Rivers are limited. As discussed in chapter 1, the damming projects of Turkey, Syria, and Iraq made the total volume of available water within the Tigris and Euphrates watershed accessible for use. The previous section of this chapter, demonstrated how the riparian states' expanding populations and other developmental factors influenced the various initiatives and projects to utilize the flows of the Tigris and Euphrates watershed. This subsection will analyze the specific factors that determine what entities have access to the flows of the Tigris and Euphrates Rivers.

Effects of Dams within the Tigris and Euphrates Watershed

Overall, there is a downward trend in the mean annual flow of the watershed based on data contained in UN-ESCWA and BGR's *Inventory of Shared Water Resources in Western*. The Euphrates River overall has a downward trend that becomes more significant beginning in the 1960s which is attributed to dam construction. The reservoirs created by the dams allow increased volumes of water to be transported from the reservoir for any of the water use classification. Additionally, the expanded surface area of the reservoirs increase evaporation losses which were naturally high due to climatic factors.³³ Figure 12 is from the UN-ESCWA and BGR study and depicts mean

annual discharge levels (average volume of water during a year) of the Euphrates River at specific points on the river over time. The most dramatic shift in water volume (mid 1970s) corresponds to the filling of the reservoirs created by the Keban and Taqba Dams in Turkey and Syria respectively. The filling of Atatürk Lake in 1992 is also reflected in figure 12.

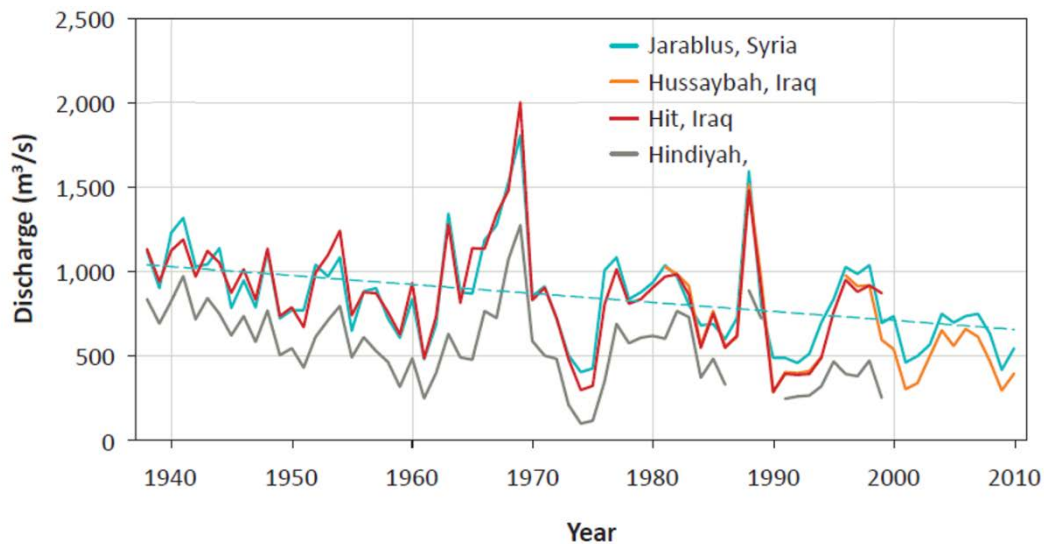


Figure 12. Euphrates Mean Annual Discharge (m³/s) 1937 to 2010

Source: United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR) “Chapter 1 Euphrates River Basin,” *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 59.

With respect to the Tigris, there is also a downward trend in mean annual flow. The pronounced downward trend is based on observed readings at Kut, Iraq. When compared to the relatively steady observances at Mosul, Iraq, figure 13 indicates that the

portion of the river between Mosul and Kut is the source of the increased draws from the river.³⁴

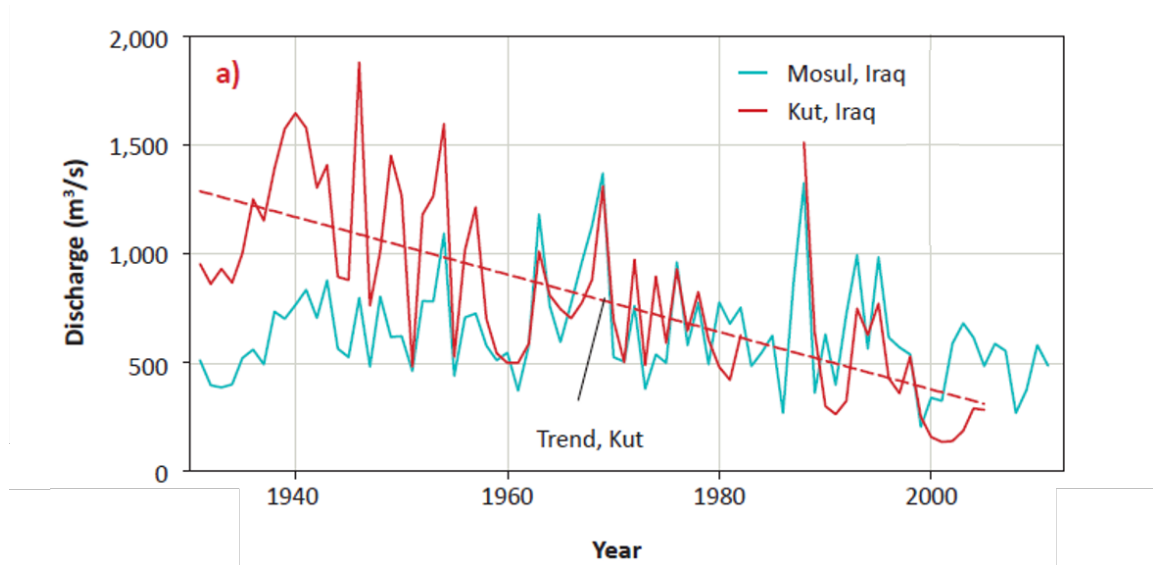


Figure 13. Tigris Mean Annual Discharge (m³/s) 1931 to 2011

Source: United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR) “Chapter 1 Euphrates River Basin,” *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 111.

The downward trend in mean annual discharge is consistent with the pace of dam construction within the watershed since 1960. Since 1960, there have been seven dams constructed on the Tigris River or one of its tributaries, and ten dams constructed on the Euphrates River. The riparian states are the principle source of competition for the flows of the Tigris and Euphrates River. Rapid dam building was a method for Turkey, Syria

and Iraq to increase the volume of water available for use and meet the demands of a growing population that was urbanizing and becoming more industrial.

This distribution of damming projects within the individual riparian states does not show a bias or deliberate effort to apportion water based on competitive factors below the state level. The following sub-section will address one instance of ethno-religiously motivated apportionment. The event was coercive and punitive in nature and not directly a reapportionment of water flows. Turkish damming projects to include the GAP occurred in predominately Kurdish areas of Turkey well outside the urban and industrial centers of western Turkey. Similarly, Syrian projects were in predominantly Sunni Arab and Kurdish areas well east of Syria's major cities.

Database Analysis

The following subsection will examine water competition based on analysis of two event databases. The "International Water Events Database" which is "a searchable database documenting over 6,400 historical international water relations from 1948 to 2008." Aaron Wolf and a team of researchers from Oregon State's College of Earth, Ocean, and Atmospheric Sciences compiled the data to document events in areas where water was a "scarce or consumable resource or as a quantity to be managed."³⁵ The "Global Database of Terrorism" is a product of the University of Maryland's National Consortium for the Study of Terrorism and Responses to Terrorism. The Global Database of Terrorism catalogs acts of terrorism worldwide since 1970 compiled from multiple sub-sources.³⁶ Analysis of both databases will provide a broad range of events

corresponding to competitive actions relating to water by addressing actions by state actors and non-state actors.

Of the 6,400 total data points within “International Water Events Database,” 573 events related to the Tigris and Euphrates watershed and one or more respective riparian states. Appendix C Tigris and Euphrates Water Event Data contains the specific analytic data supporting the following points. Events in the database are characterized by type of event. Different event types with the Tigris and Euphrates watershed data set included: water quantity, infrastructure/development, border issues, and technical cooperation/assistance. Water quantity was by the far the biggest driver of water events, with 71 percent of total events. Events are also give a severity rating ranging from -7 to 7 with -7 equating to a formal declaration of war and 7 equating to voluntary unification into one nation. The majority of water quantity events associated with the Tigris and Euphrates watershed were minor, with 74 percent rated between -1 (mild verbal expressions displaying discord in interaction) and 1 (Minor official exchanges, talks or policy expressions). This is higher than for other events, with 50 percent rated -1 to 1, hence non water quantity events were likely to be more severe. In terms of time the earliest data point occurred in 1949 and the latest occurring in 2008. The period of 1990-2000 accounted for 389 or 68 percent of the total water related events. This is consistent with the effects and reactions to the GAP damming projections within Turkey. Of the 573 Tigris and Euphrates watershed data points, there were five events with a severity rating of -4 to -7. -4 equating to political-military hostile actions. In chronological order, the first event corresponds to the dispute between Syria and Iraq outlined in chapter 1. This was a water quantity issue derived from the filling of the Tabqa Dam in the spring of

1975. The second event was an attack of Iranian forces to seize Abadan during the Iran Iraq War in May 1981. This was a navigation-related event stemming from the 1937 Treaty between Iran and Iraq which recognized the Shatt al-Arab's eastern side as the international border. In October 1986, Iranian guerrillas and anti-Baghdad Kurdish rebels conducted a failed attack to seize the Dukan Dam. Control or damage to the dam would have impacted electricity generation and flood control along the Lesser Zab River. In September 1990, Iraq claimed it had completed a water pipeline to supply drinking water from the Shatt al-Arab to Kuwait following Iraq's invasion of Kuwait in August 1990. In 1992, following the Gulf War, Iraq intentionally diverted water from the Tigris and Euphrates rivers from following into the marshlands located near Nassiriya, Iraq in order to disrupt the Shi'ite insurgency described in chapter 1 of this study. Of these two data points, the Iranian supported attack on the Dukan Dam during the Iran Iraq War and the diversion of the Tigris and Euphrates rivers as a coercive measure against the Shi'ite insurgency had potential or actual effects on the amount of water available to a specific population. Both events were a part of a greater IW conflict but were executed for a coercive effect as opposed to gaining increased control over a volume of water within the watershed.

Analysis of the "Global Database of Terrorism" yield similar findings as the "International Water Events Database." Since 1970, there have been 20,030 acts of terrorism within the Tigris-Euphrates watershed. Thirty-three of these specific acts met similar criteria for inclusion in the "International Water Events Database." Twenty-eight events occurred in Iraq. Ten events occurred during the Iraq insurgency and eighteen occurred during the current conflict in Iraq. Five events occurred in Turkey; the PKK was

responsible for each event. These events included various attacks against water related facilities such as dams, water treatment plants, and irrigation projects. The purpose of the attacks appeared disruptive in nature as opposed as an attempt to reapportion water directly.³⁷

Based on this subsection's data analysis, individual acts of terrorism or insurgencies that conduct military operations in a dispersed/sporadic manner do not appear to be significant factors in the apportionment of water within the Tigris and Euphrates watershed.

A Riparian Islamic State

As discussed previously in this section, IS is a separatist insurgency who by its nature has become or attempted to become state-like to include specific programs to manage water and water distribution. In terms of areas of control within the Tigris and Euphrates Watershed, IS reached its greatest expanse in June 2014 which is the single largest change in control/apportionment of the Tigris and Euphrates watershed since the dissolution of the Ottoman Empire. IS's ability to conduct large military operations and seize physical territory afforded the organization control over portions of the watershed as opposed to individual acts of terrorism or sporadic guerrilla operations.

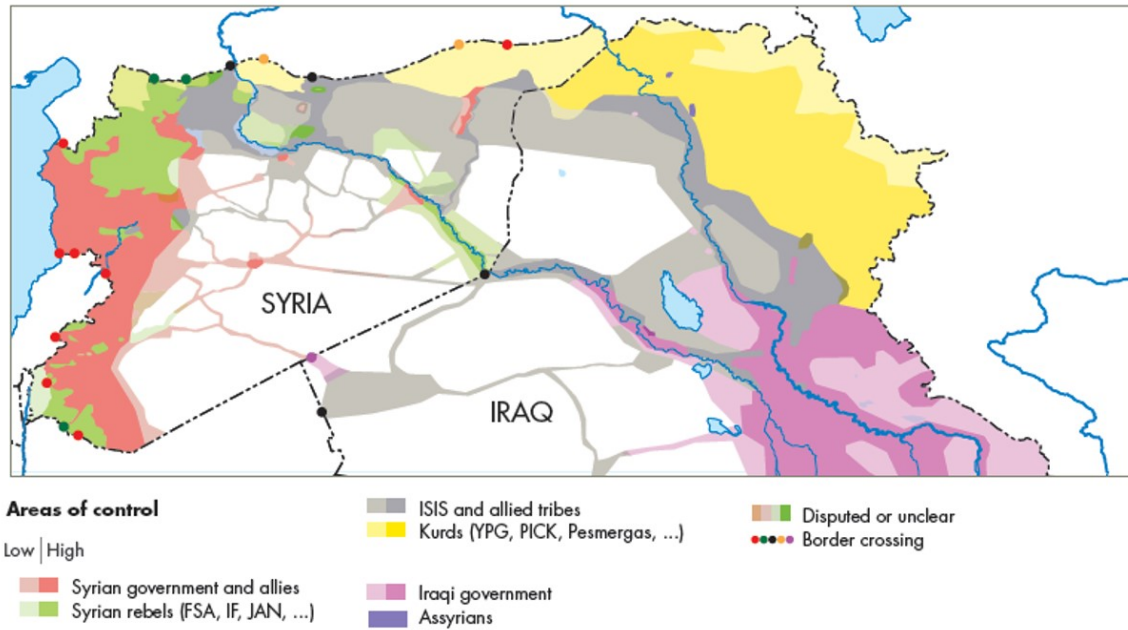


Figure 14. Areas of Control Syria and Iraq 24 June 2014

Source: Brian Michael Jenkins, “How the Current Conflicts Are Shaping the Future of Syria and Iraq,” (RAND Perspectives, 2015), 5, accessed 30 April 2017, http://www.rand.org/content/dam/rand/pubs/perspectives/PE100/PE163/RAND_PE163.pdf.

Between June 2014 and winter 2017, IS was the primary riparian entity within the Syrian and western Iraqi portions of the Tigris and Euphrates watershed assuming the same competitor aspects held previous by the Syrian and Iraqi governments. The current conflict in Syria and Iraq is a source of water competition in addition to a struggle to retake territory in traditional military terms. This dynamic has a converse relationship to water conflict theories regarding rational state-actors in that non-conflict resolution is the most advantageous solution to disputing parties. IS, an extremist irregular actor, the

opposite has been true with armed conflict being used exclusively to retake terrain and control of the watershed.

Water Stressed Populace and IW

The final section of this chapter will analyze subsidiary research question three: What are the implications for IW due to the effect of a water resource constrained/stressed populace in the Tigris and Euphrates watershed? This section provides critical linkage to the study in which the previous framing of water resource dynamics and IW will be connected through the linkage of population, the principle connection between IW and the Tigris and Euphrates watershed. This section will begin with analysis of the region wide drought that occurred between 2007 and 2010 and was an accelerant of water stress and competition for the population of the Tigris and Euphrates watershed. Multiple scholarly studies have linked effects of the 2007-2010 drought to destabilizing factors within Syria that led to the Syrian Civil War in 2011. The Syrian Civil War has expanded in the following years into the multifaceted conflict that is ongoing in the region.

Between 2007 to 2010, a significant multi-year drought occurred in the Levant and Iraq, and is an essential factor in understanding the effects of water competition on the population of the Tigris and Euphrates watershed in the last decade. Though drought is a naturally occurring event in this region, the severity of the 2007-2010 drought exacerbated the effects of increased population and corresponding demands of increased agricultural production.³⁸ The effects of the drought were especially disastrous in the Syrian portion of the Tigris and Euphrates watershed. Beginning in the early 2000s, the Syrian government instituted a broad range of policies to liberalize the Syrian economy.

Agriculture specific initiatives included decreasing state subsidies to agriculture products and opening commodity prices to regional market forces. These initiatives continued into the drought of 2007-2010. During the drought years, the Syrian government decreased fuel subsidies to farmers, thus increasing the price of pump/non-gravity fed irrigation methods. The Syrian government also attempted to implement water use reforms for irrigation creating use quotas for individual farmers. Due to corruption among government officials and more wealthy farmers, irrigation quotas were not evenly distributed.³⁹ The collective effects of the drought and Syrian government policy changes drastically decreased the amount of irrigated, and thus arable land, within the Syrian portion of the Tigris and Euphrates watershed. Based on figure 15, as one moves away from the Euphrates River, irrigation is increasingly reliant on pump irrigation methods that bring water from the river or from ground aquifers. Both of these methods are reliant on fuel to run pumps to transport the water.

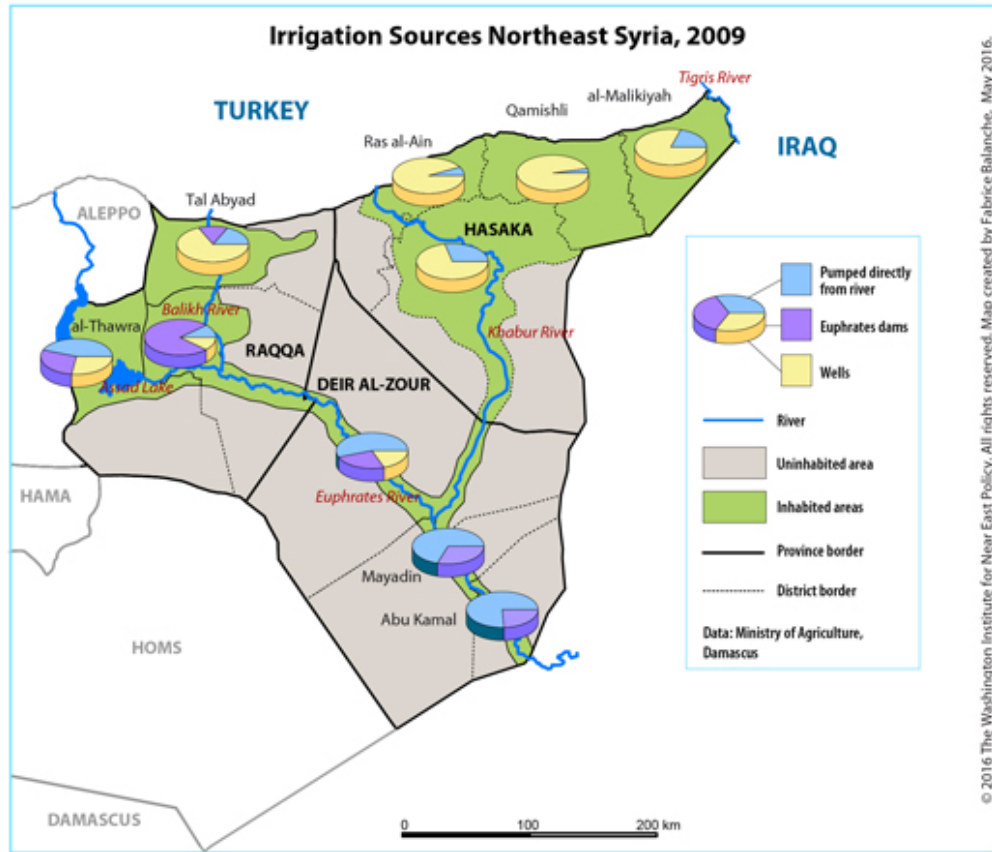


Figure 15. Irrigation Sources Northeast Syria, 2009

Source: Fabrice Balanche, “Water Issues Are Crucial to Stability in Syria’s Euphrates Valley,” The Washington Institute for Near East Policy PolicyWatch 2622, 26 May 2016, accessed 30 January 2017, <http://www.washingtoninstitute.org/policy-analysis/view/water-issues-are-crucial-to-stability-in-syrias-euphrates-valley>.

Figure 16 geographically depicts the losses of arable land in eastern Syria due to the inability of farmers to irrigate.⁴⁰ The drought negatively impacted the Levant and Iraq, yet “only Syria experienced a humanitarian crisis, with large-scale migration of populations and widespread malnutrition.”⁴¹ The crisis had disproportionate effects in the portions of the Tigris and Euphrates watershed in Syria (Aleppo, Deir ez-Zor, Hassakeh, and Raqqa governorates in which 58.1 percent of Syria’s poor were concentrated).⁴²

Though this region was considered “the bread basket” of the region and possessed a majority of Syria’s oil reserves, poverty rates, levels of healthcare, and rates of illiteracy were disproportionately negative compared to the rest of Syria.⁴³ By United Nations estimates, approximately 300,000 people migrated from this region to the urban centers of Damascus and Aleppo leaving 60-70 percent of villages uninhabited in the Hassakeh and Deir ez-Zor governates by 2009. The displaced populations of eastern Syria moved to unimproved tent cities on the periphery of Damascus and Aleppo that lacked adequate sanitation and basic services. Most continued to remain unemployed due to the inability of the local economies to absorb the rapid influx of available workers.⁴⁴

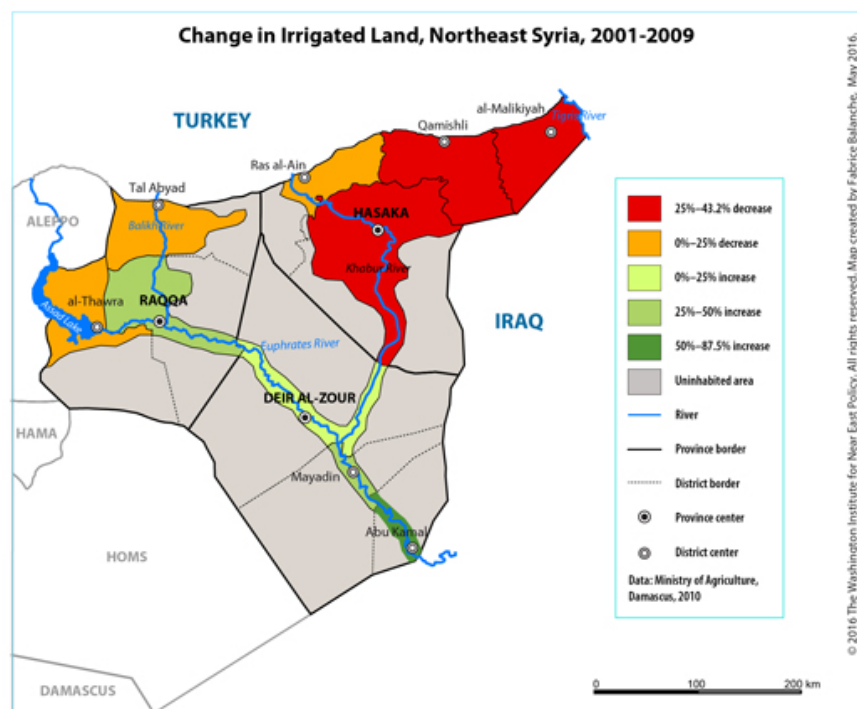


Figure 16. Change in Irrigated Land, Northeast Syria, 2001-2009

Source: Fabrice Balanche, “Water Issues Are Crucial to Stability in Syria’s Euphrates Valley,” The Washington Institute for Near East Policy PolicyWatch 2622, 26 May 2016, accessed 30 January 2017, <http://www.washingtoninstitute.org/policy-analysis/view/water-issues-are-crucial-to-stability-in-syrias-euphrates-valley>.

Portions of northern and western Iraq experienced similar dynamics resonating from inefficient agricultural/water use policy and exacerbations by the drought.⁴⁵ Based on the population geography of Iraq, these dynamics affected predominantly Sunni Arab populations further degrading already strained confidence in the post-Saddam Shi'ite dominated government of Iraq and creating similar exploitable core grievances observed in Syria.

The Syrian government response to the crisis highlights a critical dynamic for understanding the value of water to the populace of the region and governments. Governments and leaders within the Middle East and Africa have long understood that water is a strategic resource and vital to national survival.⁴⁶ The Syrian Government restricted media coverage surrounding the effects of the drought, never acknowledging the water stressed/constrained nature of eastern Syria. Such an acknowledgement would undermine decades of water and agricultural management policy and highlight the insufficient nature of Syria's water resources. The best example of the Syrian Government's blindness to the reality of water stress on the population of eastern Syria was the encouragement of resettlement of deserted areas and village.⁴⁷

Since the 1950s, Turkey, Syria, and Iraq have addressed water policy with a "supply-side approach with a specific focus on dam construction and irrigation projects."⁴⁸ By increasing access to the water of the Tigris and Euphrates watershed through damming, the riparian states were able to meet the increasing demands of their respective populations. Multiple sources referenced in this study conclude that the total volume of water within the Tigris and Euphrates watershed has been accessed and thus the system is pareto efficient. This condition makes water stress and competition a matter

of distribution. The failed water management policy in Syria exacerbated by the 2007-2010 drought created a grievance within the population of Syria for increased and more effective access to the flows of the Euphrates River. Based on the decade's old pattern of ineffectual water policy at the national and international level, portions of the population of Syria had the motivation to seek resolution for their water resource based grievances through non-state entities.

Summary and conclusions

The sections of chapter 4 are closely connected. The study's findings are based on an analytic model dependent on the analysis of the study's subsidiary research questions. The subsidiary research questions added additional context and validity to the study's findings. The study found multiple examples of water competition effects on populations within the Tigris and Euphrates watershed corresponding to specific manifestations in the nature and approaches of IW participants. IW participant actions to control or influence apportionment of water or derived benefits of water were consistent with the entities strategy and approach influenced by water competition. Analysis on the value of water utilized standard water use categories to determine the derived benefits of water and characterize these benefits specific to each riparian state. The principle competitors for the flows of the Tigris and Euphrates watershed are the nation-states and state-like entities that control the territory within the watershed. Populations within the Tigris and Euphrates watershed are vulnerable to the impacts of agriculture and water management policies executed by their respective governments. This vulnerable represents a significant liability to the government that had catastrophic consequences in Syria with

the total collapse of Syrian government control in most of the eastern portions of the country.

¹ Marcus DuBois King, "The Weaponization of Water in Syria and Iraq," *The Washington Quarterly* 38, no. 4 (Winter 2016), 154.

² Fabrice Balanche, "Water Issues Are Crucial to Stability in Syria's Euphrates Valley," The Washington Institute for Near East Policy PolicyWatch 2622, 26 May 2016, accessed 30 January 2017, <http://www.washingtoninstitute.org/policy-analysis/view/water-issues-are-crucial-to-stability-in-syrias-euphrates-valley>.

³ King, 157.

⁴ Bard E. O'Neill, *Insurgency and Terrorism From Revolution to Apocalypse* 2nd ed. (Washington, DC: Potomac Books, 2005), 51.

⁵ Erin Cunningham, "Islamic State Jihadists Are Using Water as a Weapon in Iraq," *Washington Post*, 7 October 2014, access 15 April 2017, https://www.washingtonpost.com/world/middle_east/islamic-state-jihadists-are-using-water-as-a-weapon-in-iraq/2014/10/06/aead6792-79ec-4c7c-8f2f-fd7b95765d09_story.html?hpid=z1&utm_term=.d1af8b410504.

⁶ Ibid.

⁷ Ibid.

⁸ King, 155.

⁹ Cunningham.

¹⁰ Maggie Fick, "Special Report: For Islamic State, Wheat Season Sows Seeds of Discontent," *Rueters*, 20 January 2015, accessed 15 April 2017, <http://www.reuters.com/article/us-mideast-crisis-planting-specialreport-idUSKBN0KT0W420150120>.

¹¹ National Geographic Society, *Atlas of the Middle East* (Roanoke, VA: R.R. Donnelley and Sons, 2003), 62.

¹² United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR) "Chapter 1 Euphrates River Basin," *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 59.

¹³ Food and Agriculture Organization (FAO) of the United Nations, "Securing Food for a Growing World Population," *Water for People Water for Life: The United*

Nations World Water Development Report (Barcelona: UNESCO and Berghahn Books: 2003), 194.

¹⁴ National Geographic Society, 64.

¹⁵ FAO, “Securing Population,” 200.

¹⁶ Ibid., 194.

¹⁷ FAO, “Securing Population,” 201.

¹⁸ FAO, “Turkey, Syria, and Iraq Country Data,” AQUASTAT Main Database, assessed 1 April 2017, <http://www.fao.org/nr/water/aquastat/main/index.stm>.

¹⁹ Ibid.

²⁰ Republic of Turkey Ministry of Development, “GAP Action Plan: 2014-2018” (Southeastern Anatolia Project (GAP) Regional Development Administration, December 2014), 19, 21-22, accessed 1 April 2017, <http://yayin.gap.gov.tr/pdf-view/web/index.php?Dosya=51b19136fd>.

²¹ Ibid., 20.

²² Ali Akanda, Sarah Freeman, and Maria Placht, “The Tigris-Euphrates River Basin: Mediating a Path Towards Regional Water Stability,” *al Nakhlah: The Fletcher School Journal for issues related to southwest Asia and Islamic Civilization* (Spring 2007): 3, accessed 5 November 2016, [http://fletcher.tufts.edu/AlNakhlah/Archives/~media/Fletcher/Microsites/alpercent20Nakhlah/archives/pdfs/placht-2.pdf](http://fletcher.tufts.edu/AlNakhlah/Archives/~/media/Fletcher/Microsites/alpercent20Nakhlah/archives/pdfs/placht-2.pdf).

²³ Ibid.

²⁴ Food and Agriculture Organization (FAO), International Fund for Agricultural Development (IFAD), and World Food Program (WFP), *The State of Food Insecurity in the World: The multiple dimensions of food security* (Rome: FAO, 2013), 16, accessed 17 April 2017, <http://www.fao.org/docrep/018/i3434e/i3434e.pdf>.

²⁵ FAO, “Turkey Data.”

²⁶ FAO, “Water Use,” AQUASTAT Main Database, assessed 1 April 2017, http://www.fao.org/nr/water/aquastat/water_use/index.stm.

²⁷ Republic of Turkey Ministry of Development, “GAP Action Plan: 2014-2018” (Southeastern Anatolia Project (GAP) Regional Development Administration, December 2014), 18, accessed 1 April 2017, <http://yayin.gap.gov.tr/pdf-view/web/index.php?Dosya=51b19136fd>.

²⁸ Ibid., 19-22.

²⁹ United States Energy Information Administration, “Syria International Energy Statistics,” United States Department of Energy, accessed 1 April 2017, <https://www.eia.gov/>.

³⁰ Rajan Gupta and Harihar Shankar, “Iraq Energy Systems Map,” Global Energy Observatory Database, accessed 1 April 2017, <http://globalenergyobservatory.org/>.

³¹ United States Energy Information Administration, “Iraq International Energy Statistics,” United States Department of Energy, accessed 1 April 2017, <https://www.eia.gov/>.

³² Republic of Turkey Ministry of Development, 21-22.

³³ United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR) “Chapter 1 Euphrates River Basin,” *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 59.

³⁴ *Ibid.*, 101.

³⁵ Aaron Wolf, “International Water Event Database: 1950-2008” (Transboundary Freshwater Dispute Database, College of Earth, Ocean, and Atmospheric Sciences, Oregon State University), accessed 27 February 2017, <http://www.transboundarywaters.orst.edu>.

³⁶ National Consortium for the Study of Terrorism and Responses to Terrorism (START), 2016, Global Terrorism Database Data File, accessed 30 March 2017, <https://www.start.umd.edu/gtd>.

³⁷ *Ibid.*

³⁸ Francesca De Châtel, “The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution,” *Middle Eastern Studies* 50, no. 2 (27 January 2014): 523.

³⁹ Balanche.

⁴⁰ *Ibid.*

⁴¹ Châtel, 522.

⁴² *Ibid.*, 525.

⁴³ *Ibid.*

⁴⁴ *Ibid.*, 527.

⁴⁵ King, 154-55.

⁴⁶ Châtel, 528.

⁴⁷ Ibid., 528-29.

⁴⁸ Ibid., 529.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Chapter 5 will present the conclusions and recommendations of this study. The purpose of the study is to facilitate better understanding of Irregular Warfare (IW) within the Tigris and Euphrates watershed by analyzing factors associated with competition for available water within the watershed. The issue is that the respective watersheds traverse multiple nation-states, ethnic, social and religious boundaries creating friction points with regard to equitable use and management of the watersheds. Chapter 5 is organized into the following sections: Summary of Finding, Interpretation of Results, unexpected results, Recommendations, and Summary and Conclusions.

Summary of Findings

The research indicates that the population expansion within the Tigris and Euphrates watershed and corresponding desires of the riparian states to achieve self-sufficiency in terms of agricultural, water, and energy resources created unique and unstainable stress on water resources and management practices within the watershed. The 2007-2010 drought exacerbated these circumstances in Syria and to lesser degree in Iraq creating populations with core grievances connected to ineffective water management policy. Within Syria, Multiple insurgent groups opposed the Syrian government and offered an alternative to the aggrieved population. Water competition had the most profound influence on IS in that specific aspects of IS's insurgency type, strategic approach, and actions were effected by water competition. The appeal of IS

crossed international boundaries to include broad appeal in Iraq. This finding contrasts with previous observations regarding armed conflict and water. Previous findings addressed conventional warfare between nation-states and correctly concluded armed conflict was not the most advantageous method to resolve water related conflict. This study's findings do not refute previous analysis. The potential for water competition and water stress to drive IW adds increased context to the greater body of existing knowledge.

The research indicates that the current conflict in Syria and Iraq is the most significant change in the apportionment in water since the fall of the Ottoman Empire. The research indicates that control of water resources within a water stressed/water constrained environment allows the controlling entities to harness the full utility of water to provide value to supported populations and use water resources coercively to influence adversaries. Lastly, catastrophic attacks on water management facilities are less likely than previously thought. Success of IW groups, even very extreme organizations such as IS, tends to moderate behavior because IW success leads to state like responsibility. Preservation of water management infrastructure is essential to any governing body.

Interpretation of Findings

Mismanagement of water resources internationally or within a state has disruptive effects on the population that are conducive to the initiation and expansion of IW. There are tangible components to even the most ideological focused conflicts. IW is inherently a contest of relevancy and legitimacy within an affected population. Access to water and water's derivatives is critical to the full range of individual and societal needs. Beyond communicating a viable and desirable governmental alternative with respect to political,

ethnic, and/or religious factors, insurgencies have to address economic and resources related desires of the population such as utilities. Within IW in the Tigris and Euphrates river valleys, increased access to water through increased territorial control or disruption of an adversary's control of water represents a tangible aim that an ideologically motivated actor can communicate to a population they are trying to influence. IS's specific insurgency type and approach is very geography centric in that the manifestation of the insurgency's ideals corresponded to control of physical territory. As discussed in chapters 1 and 4, the IS insurgency type and aspects of approach are a shift from other insurgent and terrorist organizations with similar religious/political objectives. The physical control exerted by IS on the Tigris and Euphrates watershed was driven and enabled by the water stressed factors of the region preceding the conflict. Geographic and resource related factors are not new to IW or IW conflict since World War II. Many aspects of Marxist/Leninist ideology directly address a population's core grievances derived from ineffective management of physical resources. Returning to the pareto efficient nature of the Tigris and Euphrates watershed, volumes of water cannot be expanded to one entity without a loss to another entity in terms of water volume. In a region defined by an abundance of energy resources, water competition could be seen as a unique dynamic requiring increased regional cooperation and collaborative management. Conversely, there is also potential for water competition to continue ethno-religious division by ensuring select groups have access to the resource.

This research study is not intended to have predictive value or have direct policy implications. The previous point adds context to conflict resolution formulation in Syria and Iraq. As discussed in chapter 4, efficient and effective water management requires

significant manmade facilities such as pumps, irrigation networks, etc. These systems were stressed prior to the conflict and are now in severe disrepair. Balanche correctly asserts that an incredible amount of resources and action is needed to restore the agricultural capacity of eastern Syria. Ensuring the agricultural viability of this region is critical to long term conflict resolution. The long term viability of Iraq is also heavily influenced by efficient and effective water management. Turkey has a preponderance of influence on these dynamics. Balanche and numerous other scholars are adamant that a defined minimum volume of water flow must be identified, agreed upon, and maintained between Turkey and its downstream riparian partners.

The interconnectivity of riparian relations reinforces maintaining the territorial integrity of Syria and Iraq. From a water resource point of view, further devolution in the region would add additional riparian actors further complicating collaboration. This devolution would occur in downstream areas further retarding the ability of the entities to ensure Turkey maintained agreed upon and/or sufficient downstream flows.

Unexpected Findings

This study had a broad aperture with respect to identifying connections between water competition and IW within the Tigris and Euphrates watershed. Though competitive dynamics have increased over time making connections in previous IW conflicts less likely, the author expected to find some connections during the multi-faceted Iraq Insurgency between 2003 and 2011 as well as in Turkey relating to the PKK. None of the observed data indicated a significant impact of water competition of IW participants or actions. Data points involving attacks on infrastructure such as a water treatment plant or power distribution resonating from a hydroelectric facility indicated an

intent to disrupt general governmental function as opposed to specific strategy to influence or control water resources or derived benefits of water. In this respect, the nature of IS is an outlier when compared to other IW conflicts and participants within the watershed.

Recommendations

Examination of all IW conflicts from an environmental competition point of view is warranted. Returning to the motivations of this research study, a preponderance of research on the subject of IW focuses on societal measures such as religious affiliation, ethnicity, and governance. Competition for a resource that impacts basic human needs appears to be as significant as the aforementioned societal measures. An important lesson derived from this research process is the difficulty of gathering accurate, unclassified data regarding an ongoing event/phenomenon. As a student at the Command and General Staff College, the author was not in a position to gather data directly and relied on unclassified reporting.

Summary and conclusions

Environmental and resource competition are not new human dynamics. However, human population expansion in the twentieth and twenty-first century greatly increased the potential and occurrence of violent armed conflict regarding resources. Water resources are increasingly contentious and potential sources of conflict. The flowing nature of surface water is an inherently different dynamic when compared to a geographically fixed resource such as an oil/gas well. This dynamic creates multiple entities who share a common resource. Water resources also address human needs and

functions from the basic, such as water consumption, to advanced forms of utilization such as electrical power generation. The connection of water competition and IW is natural given the rise of each dynamic in recent history. The population centric nature of IW reinforces this connection because negative effects of water competition have the potential to disproportionately impact motivations of the populace as opposed to nation-state governments as observed in Syria. The function, form, and practice of IW participants will be heavily influenced in which water competition and/or water stress is prevalent. Continued study and awareness between water competition and water stress dynamics is essential for holistically understanding the twenty-first century security environment.

ILLUSTRATIONS

Illustration 1 is compilation chart of all hydroelectric and combined cycle electricity generating power plants located within the Tigris and Euphrates watershed. Combined cycle plants utilize water to run steam turbines heated by fossil fuel sources. These types of plants are included in the illustration because their derived electrical power is a direct result of water from the rivers.

Hydroelectric and Combined Cycle Power Plants Located within Tigris and Euphrates Watershed						
Country	River (tributary)	Name of plant	Design Capacity (MW)	Year Built	Notes	Source
Iraq	Euphrates	Haditha Hydroelectric Power Plant	660	1987		1
Iraq	Tigris (Adhaim River)	Adhaim Hydroelectric Power Plant	27	1999		1
Iraq	Tigris (Diyala)	Darbandikhan Hydroelectric Power Plant	249	1994		1
Iraq	Tigris (Little Zab)	Dukan (Dokan) Hydroelectric Power Plant	400	1979		1
Iraq	Euphrates	Hindiyah Hydroelectric Power Plant	40	1914	estimated	4
Iraq	Tigris (Diyala)	Diyala Weir Hydroelectric Power Plant	27	1969	estimated	4
Iraq	Tigris	Mosul Hydroelectric Power Plant Iraq	1060	1986		1
Iraq	Euphrates	Al Anbar Combined Cycle Power Plant	1642.6	2013	Construction in progress	3
Iraq	Tigris (Lesser Zab)	Erbil Gas Power Station, Combined Cycle	1500	2008		2
Iraq	Tigris (Lesser Zab)	Suleimaniah Gas Power Station, Combined Cycle	1500	2010	Construction in progress	2
Iraq	Tigris (Diyala)	Hemrin Hydroelectric Power Plant	50	1981		4
Syria	Euphrates	Teshreen (Tishrin) Hydroelectric Power Project	630	1999		1
Syria	Euphrates	Taqba (Al-Thawra) Hydroelectric Power Project	800	1974		1
Syria	Euphrates	Baath Hydroelectric Power Project	75	1987		1
Turkey	Euphrates	Karkamis Hydroelectric Power Plant	192	1999	Part of GAP	1
Turkey	Euphrates	Birecik Hydroelectric Power Plant	672	2001	Part of GAP	1
Turkey	Euphrates	Ataturk Hydroelectric Power Plant	2400	1992	Part of GAP	1
Turkey	Euphrates	Karakaya Hydroelectric Power Plant	1800	1987	Part of GAP	1
Turkey	Tigris	Dicle Hydroelectric Power Plant	110	1997	Part of GAP	1
Turkey	Tigris	Batman Hydroelectric Power Plant	198	1999	Part of GAP	1
Turkey	Tigris	Kralkizi Hydroelectric Power Plant	90	1997	Part of GAP	4
Turkey	Euphrates (Peri River)	Ozluce Hydroelectric Power Plant	170	2000	Not part of GAP	1
Turkey	Euphrates	Keban Hydroelectric Power Plant	1330	1975	Not part of GAP	1

1. Rajan Gupta and Harihar Shankar, "Turkey, Syria, and Iraq Energy Systems Map," Global Energy Observatory Database, accessed 1 April 2017, <http://globalenergyobservatory.org/>

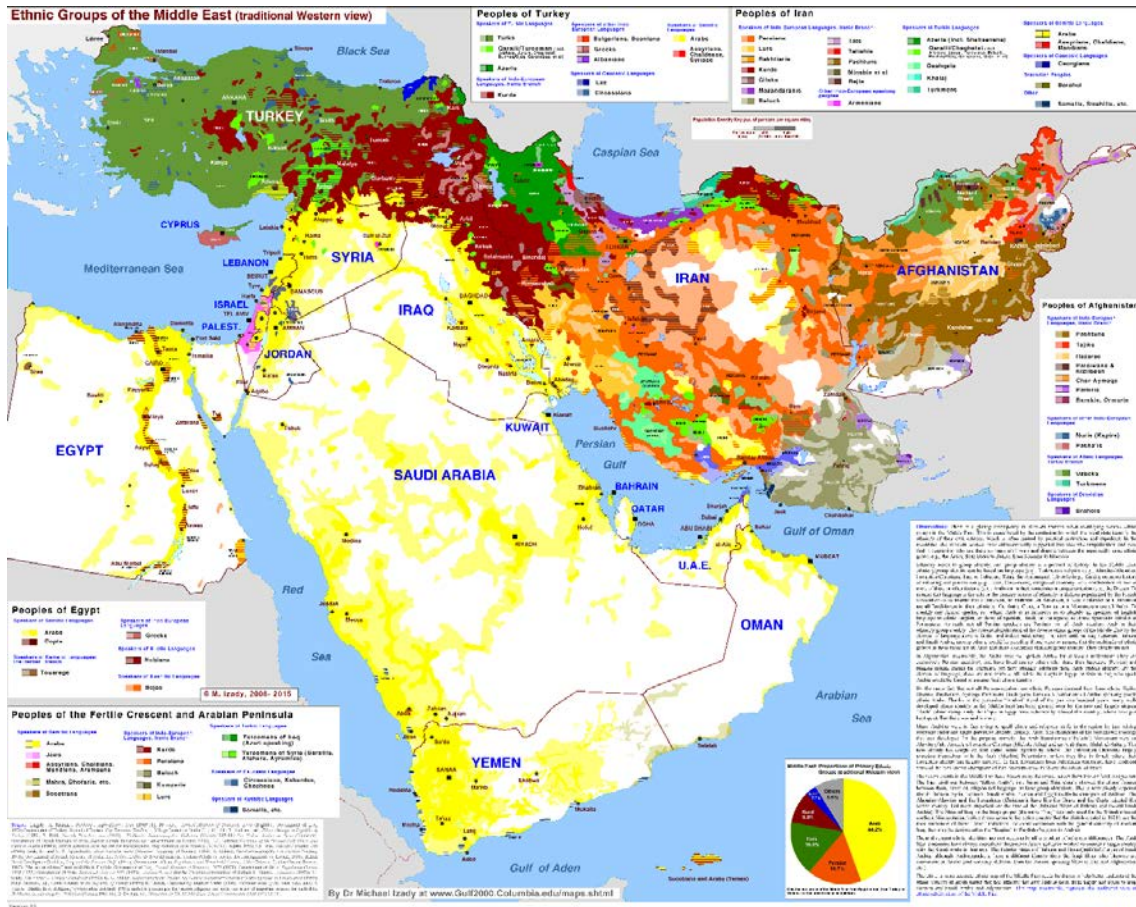
2. Mass Group Holding, "Project Overviews for Erbil Power Station and Suleimaniah Gas Power Station," accessed 1 April 2017, <http://www.massgroupholding.com/MassPages.aspx?PID=14&lang=en>

3. Metka Group, "Project Overview for Al Anbar Power station," accessed 1 April 2017, <http://www.metka.com/en/activity-sectors/projects/combined-cycle-power-plant-of-1642-6-mw-al-anbar-iraq>

4. United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), Inventory of Shared Water Resources in Western Asia (Beirut: United Nations, 2013), 113.

Source: Produced by the author based on information from multiple sources annotated in the table.

ETHNIC GROUPS OF THE MIDDLE EAST



Source: Dr. Michael Izady, “Ethnic Groups of the Middle East (Large),” University of Columbia Gulf/2000 Project Maps and Statistics Collection, 2013, accessed 17 November 2016, <http://gulf2000.columbia.edu/maps.shtml>.

APPENDIX B

INSURGENCY EVALUATION FRAMEWORKS

Types of Insurgencies- Goal centric differences generally define the multiple types of insurgencies (19).	
Insurgency Type	Description
Anarchist	Goal is to destroy but not replace political systems. Modern political structures are seen as repressive and must be destroyed (20).
Egalitarian	Equitable distributional of wealth and resources and centrally controlled power structures. Marxist/Leninist groups are the most common example (20).
Traditionalist	Characterized by a small ruling elite class and restoration of a prior socio-political system. Lebanese Hezbollah and Al Qaida are the most prolific examples (21).
Apocalyptic-Utopia	Goal is to destroy traditional institutions to facilitate a new coming based on a fringe religious ideology or believe (23-24).
Pluralist	Establish political system that emphasizes "individualism, liberty and compromise" while generally being inclusive and representative of the population (24).
Secessionist	Goal is to disassociate with the current state and form either a new state or unite with another state (24-25).
Reformist	Non-revolutionary movements that seeks change, usually very specific, in political system but not destruction of or separation from the political system (26).
Preservationist	Goal is to maintain the status quo within the current political system regarding social, political, and/or economic dynamics (27).
Commercialist	Goal is to "acquire material resources through seizure and control of political power." These groups do not have stated political goals and generally resemble criminal organizations with state like control/powers (28-29).

Source: Bard E. O'Neill, *Insurgency and Terrorism From Revolution to Apocalypse*, 2nd ed. (Washington, DC: Potomac Books, 2005), 19-20.

Strategic Approaches- The means utilized by the insurgent generally defines the strategy of the insurgency (45).	
Insurgency Strategy	Description
Conspiratorial	Remove of "ruling authorities" through "limited and swift use of force." The Bolshevik Revolution is the most prominent example (46).
Protracted Popular War	Framed and implemented by Mao Tse-tung in China, this approach attempts to organize the whole of a population to overthrow a government or occupying power utilizing three distinct phases: organization, guerrilla war, and war of maneuver. Political indoctrination and mobilization is paramount throughout all three phases (49-55).
Military-Focus Strategy	This approach seeks victory through the military defeat of the adversary directly. This approach can utilize conventional, guerrilla, and terrorist tactics and does not subordinate military forces/operations to a political entity. The Castro led Cuban insurgency is the most prolific example (56-57).
Urban-warfare strategy	A similar approach to popular war and military focused strategies, this approach seeks to erode government control within population centers through violent and subversive means. Lack of institutional control and devolution of the state into armed conflict will allow the movement to grow in size and influence. Mature urban-warfare insurgencies can spread to the surrounding countryside (61-62).
Al Qaeda transnational approach	The transnational approach is a recent vision to insurgent strategic approaches and epitomized by Al Qaida. Not bound geographically in a traditional sense, though the group does need safe havens, this approach uses a wide variety of violent tactics to achieve political goals that generally support the overall goal of the group (65-66).

Source: Bard E. O'Neill, *Insurgency and Terrorism From Revolution to Apocalypse*, 2nd ed. (Washington, DC: Potomac Books, 2005), 45-66.

Insurgency Outcome Indicators			
	Insurgent Victory	Negotiated Settlement	Government Victory
Military / Security	<ul style="list-style-type: none"> - Rapid growth of insurgent forces or significant expansion of insurgent control of territory and population. - Reports of military plots, coup attempts, massive desertion, defection, or surrender of security forces. 	<ul style="list-style-type: none"> - Reports that neither side believes it can win militarily. - A dramatic and unexpected battlefield victory by one of the belligerents that is quickly followed by overtures to negotiate. Neither party wants to negotiate from a position of weakness, and a belligerent on the decline may seek a symbolic victory to improve its bargaining position. 	<ul style="list-style-type: none"> - As the government succeeds in reducing the number of insurgents and the size of their infrastructure, the insurgents become harder to find and to eliminate. - Civilians feel safe enough to leave their homes at night. - Refugees or internally displaced persons voluntarily return to their homes. - Civilians openly interact with security force personnel. - Civilians promptly alert security forces to the presence of insurgents. - Security forces are able to operate throughout the country, including in formerly insurgent-held areas. - The police reclaim responsibility for security, and the military largely returns to base
Third Party Inter-actions	<ul style="list-style-type: none"> - Withdrawal of support for the government from critical foreign allies, pressure from those allies to overhaul the government's policy to address insurgent grievances, or increasing international support or recognition for the insurgents. - Insurgent co-optation, incorporation, or elimination of other major groups opposed to the government. 	<ul style="list-style-type: none"> - Reports that the insurgents believe they can win an election or otherwise achieve their goals through legal political participation. 	<ul style="list-style-type: none"> - Evidence that foreign patrons or allies are cutting off support or are pressing the insurgents or the government to negotiate.

<p>Political Support / Legitimacy</p>	<ul style="list-style-type: none"> - Withdrawal of support for the government by specific, critical segments of the domestic population, possibly even including elites aligned with the government leaving the country. - Evidence that the population increasingly views the government as illegitimate. 	<ul style="list-style-type: none"> - Reports that the insurgents believe they can win an election or otherwise achieve their goals through legal political participation. - A change of government that brings to power a strong leader whom the insurgents view as personally committed to resolving the conflict and capable of ensuring the compliance of other government elements. - Evidence of a sudden government willingness to seek a negotiated settlement with the insurgents. - A moderation of insurgent goals. <p>Incorporation into the government's negotiating position of a liberal amnesty offer and mechanisms for former insurgents to participate in the legal political process.</p>	<ul style="list-style-type: none"> - Civilians openly interact with officials or security force personnel. - Officials can travel with minimal security and can spend their nights in areas that formerly were unsafe. - Government offices are open and functioning normally.
<p>Economic</p>	<ul style="list-style-type: none"> - Severe weakening of the national economy, possibly including departure of multinational corporations, as a result of the insurgency. 		<ul style="list-style-type: none"> - Commercial activity increases, markets reopen, and businesses remain open after dark.

Source: Department of Defense, Joint Publication 3-24, *Counterinsurgency* (Washington, DC: Government Printing Office, 2013), I-3.

APPENDIX C

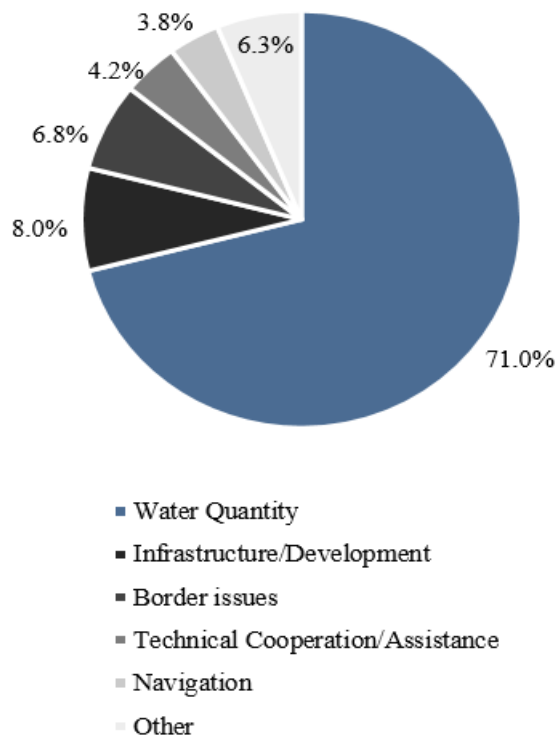
TIGRIS AND EUPHRATES WATER EVENT DATA

Appendix C is a collection of graphical depictions of water events occurring within or in relation to the Tigris and Euphrates river watershed. The data is derived from the following:

Aaron Wolf, “International Water Event Database: 1950-2008,” Product of the Transboundary Freshwater Dispute Database, College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, accessed 27 February 2017, <http://www.transboundarywaters.orst.edu>

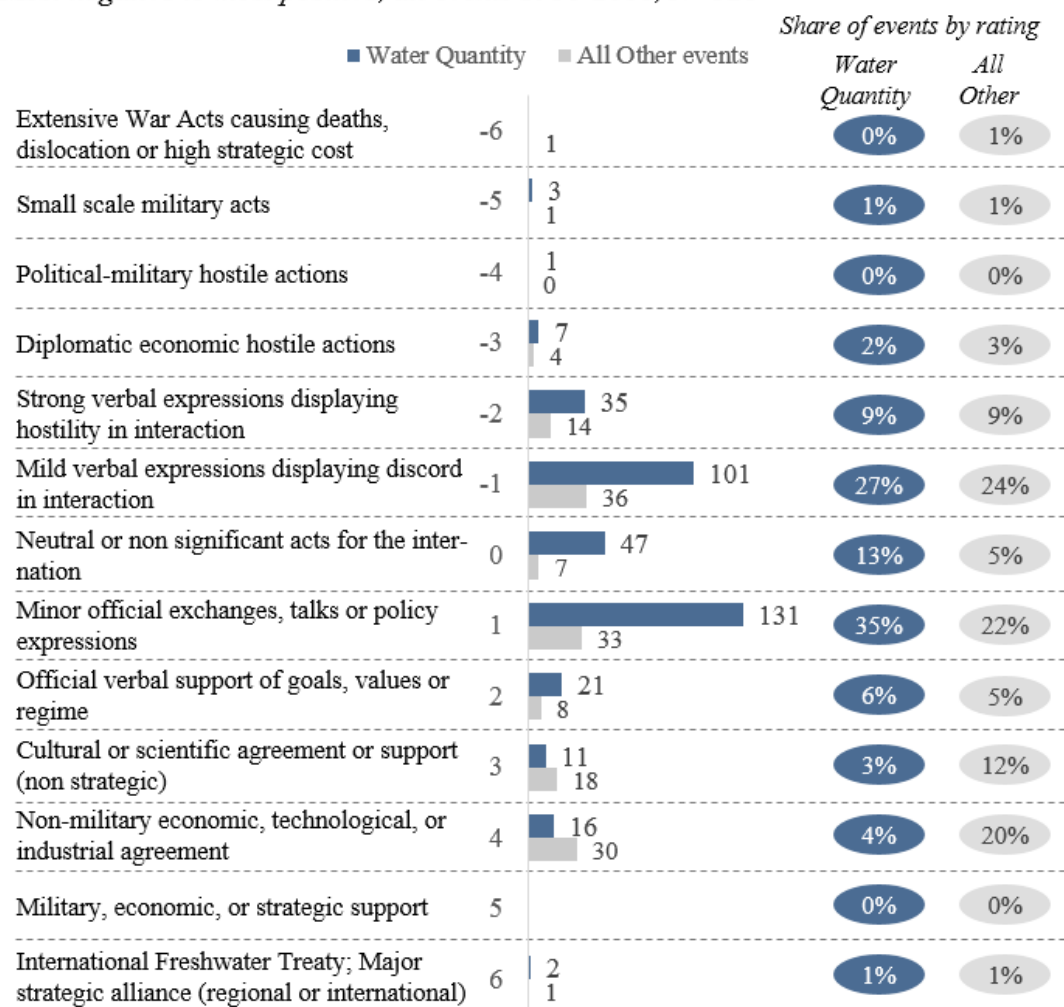
Events by type in the Tigris and Euphrates river basin¹

All events 1950-2008, N=573



Share of Water Quantity and All Other Events by Severity rating

Most negative to most positive, all events 1950-2008, N=528^{2,3}



1. Other includes Irrigation, Joint Management, Water Quality, Hydro-power/Hydro Electricity, and Flood Control/Relief.

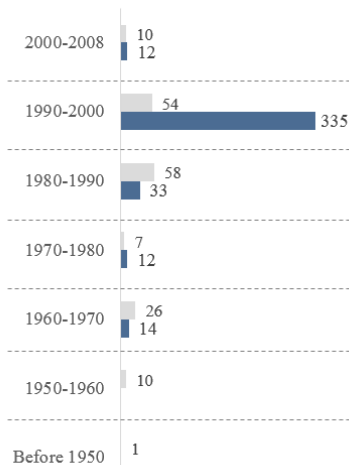
2. 45 events were not given a severity rating

3. No events were rated -7 (Formal Declaration of War) or 7 (Voluntary unification into one nation)

Events by year in the Tigris and Euphrates river basin

All events 1950-2008, N=573

■ All Other Events ■ Water Quantity



Water Quantity Events by year and severity in the Tigris and Euphrates river basin

All events 1950-2008, N=xx



RE-CENTERED (BAR) SCALE	EVENT DESCRIPTION	RE-CENTERED (BAR) SCALE	EVENT DESCRIPTION	RE-CENTERED (BAR) SCALE	EVENT DESCRIPTION
-7	Formal Declaration of war	-2	Strong verbal expressions displaying hostility in interaction: Warning retaliation for acts; making threatening demands and accusations; condemning strongly specific actions or policies; denouncing leaders, system, or ideology; postponing heads of state visits; refusing participation in meetings or summits; leveling strong propaganda attacks; denying support; blocking or vetoing policy or proposals in the UN or other international bodies. <i>Official interactions only.</i>	3	Cultural or scientific agreement or support (non-strategic): Starting diplomatic relations; establishing technological or scientific communication; proposing or offering economic or military aid; recognizing government; visit by head of state; opening borders; conducting or enacting friendship agreements; conducting cultural or academic agreements or exchanges. <i>Agreements to set up cooperative working groups.</i>
-6	Extensive War Acts causing deaths, displacement or high strategic cost: Use of nuclear weapons; full scale air, naval, or land battles; invasion of territory; occupation of territory; massive bombing of civilian areas; capturing of soldiers in battle; large scale bombing of military installations; chemical or biological warfare.	-1	Mild verbal expressions displaying discord in interaction: Low key objection to policies or behavior; communicating dissatisfaction through third party; failing to reach an agreement; refusing protest note; denying accusations; objecting to explanation of goals, position, etc.; requesting change in policy. <i>Both unofficial and official, including diplomatic notes of protest.</i>	4	Non-military economic, technological or industrial agreement: Making economic loans, grants; agreeing to economic pacts; giving industrial, cultural, or educational assistance; conducting trade agreements or granting most favored nation status; establishing common transportation or communication networks; selling industrial-technological surplus supplies; providing technical expertise; ceasing economic restrictions; repaying debts; selling non-military goods; giving disaster relief. <i>Legal, cooperative actions between nations that are not treaties; cooperative projects for watershed management, irrigation, poverty-alleviation.</i>
-5	Small scale military acts: Limited air, sea, or border skirmishes; border police acts; annexing territory already occupied; seizing material of target country; imposing blockades; assassinating leaders of target country; material support of subversive activities against target country.	0	Neutral or non-significant acts for the inter-nation situation: Rhetorical policy statements; non-consequential news items; non-governmental visitors; indifference statements; compensating for nationalized enterprises or private property; no comment statements.	5	Military economic or strategic support: Selling nuclear power plants or materials; providing air, naval, or land facilities for bases; giving technical or advisory military assistance; granting military aid; sharing highly advanced technology; intervening with military support at request of government; concluding military agreements; training military personnel; joint programs and plans to initiate and pursue disarmament.
-4	Political-military hostile actions: Inciting riots or rebellions (training or financial aid for rebellions); encouraging guerrilla activities against target country; limited and sporadic terrorist actions; kidnapping or torturing foreign citizens or prisoners of war; giving sanctuary to terrorists; breaking diplomatic relations; attacking diplomats or embassies; expelling military advisors; executing alleged spies; nationalizing companies without compensation.	1	Minor official exchanges, talks or policy expressions--mild verbal support: Meeting of high officials; conferring on problems of mutual interest; visit by lower officials for talks; issuing joint communiqués; appointing ambassadors; announcing cease-fires; non-governmental exchanges; proposing talks; public non-governmental support of regime; exchanging prisoners of war; requesting support for policy; stating or explaining policy.	6	International Freshwater Treaty: Major strategic alliance (regional or international): Fighting a war jointly; establishing a joint military command or alliance; conducting joint military maneuvers; establishing economic common market; joining or organizing international alliances; establishing joint program to raise the global quality of life.
-3	Diplomatic-economic hostile actions: Increasing troop mobilization; boycotts; imposing economic sanctions; hindering movement on land, waterways, or in the air; embargoing goods; refusing mutual trade rights; closing borders and blocking free communication; manipulating trade or currency to cause economic problems; halting aid; granting sanctuary to opposition leaders; mobilizing hostile demonstrations against target country; refusing to support foreign military allies; recalling ambassador for emergency consultations regarding target country; refusing visas to other nationals or restricting movement in country; expelling officials; terminating major agreements. <i>Unilateral construction of water projects against another country's protests; reducing flow of water to another country; abrogation of a water agreement.</i>	2	Official verbal support of goods, values, or regime: Official support of policy; raising legation to embassy; reaffirming friendship; asking for help against third party; apologizing for unfavorable actions or statements; allowing entry of press correspondents; thanking or asking for aid; resuming broken diplomatic or other relations.	7	Voluntary unification into one nation: Merging voluntarily into one nation (state); forming one nation with one legally binding government.

APPENDIX D

TIGRIS AND EUPHRATES DAM DATA

Country	River	Dam Name	Completion Year	Hydroelectric Capacity (MCM)	Purpose
Iraq	Euphrates	Hindiyah	1914		I, HP
Iraq	Euphrates	Ramadi	1948	3,300	FC, I
Turkey	Euphrates	Keban	1974	31,000	HP, FC
Syria	Euphrates	Tabqa	1975	14,000	HP, I
Iraq	Euphrates	Fallujah	1985		FD, I
Iraq	Euphrates	Haditha (Al Qadisiyah)	1987	8,280	FC, I, HP
Syria	Euphrates	Baath	1987	90	HP, FC
Turkey	Euphrates	Karakaya	1987	580	HP, FC
Turkey	Euphrates	Atatürk	1992	48,700	HP, I
Syria	Euphrates	Tishreen	1999	1,900	HP
Turkey	Euphrates	Karkamis	1999	160	HP, FC
Turkey	Euphrates	Birecik	2000	1,220	HP, I
Iraq	Tigris	Kut	1939		I
Iraq	Tigris	Tharthar (Samarra Barrage)	1954	85,000	FC, I, HP
Iraq	Tigris	Mosul	1985	11,100	HP, FC, I
Turkey	Tigris	Goksu	1991	600	I
Turkey	Tigris	Kralkizi	1997	1,900	HP
Turkey	Tigris	Tigris (Dicle)	1997	6,000	HP, I, WS
Turkey	Tigris	Batman	1999	1,200	I, HP, FC,
Turkey	Tigris	Garzan	2012	165	HP, I
Iraq	Tigris (Lesser Zab)	Dukan	1961	6,800	I, HP
Iraq	Tigris (Lesser Zab)	Dibis	1965	3,000	I
Iraq	Tigris (Diyala)	Derbendikhan	1962	3,000	I, HP, FC
Iraq	Tigris	Hemrin	1981	2,400	I, HP

	(Diyala)				
Iraq	Tigris (Diyala)	Diyala	1969		I, FC, HP
Iraq	Tigris (Adhaim)	Adhaim	1999	1,500	FC, I, HP
Purpose Key: I- irrigation, HP- Hydroelectric Power Generation, FC-Flood Control, WS- Water Supply, FD- Flow Direction					

Source: United Nations-Economic and Social Commission for Western Asia (UN-ESCWA) and Federal Institute for Geosciences and Natural Resources (BGR), *Inventory of Shared Water Resources in Western Asia* (Beirut: United Nations, 2013), 63, 113, and 115.

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